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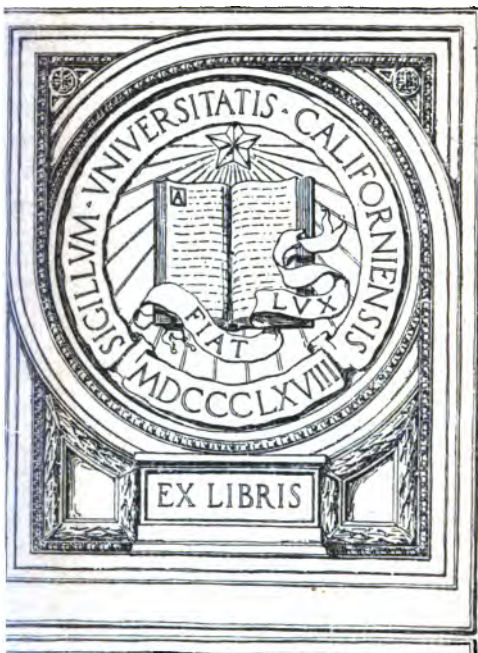
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BACON;
HIS WRITINGS
AND
HIS PHILOSOPHY.



BY GEO. L. CRAIK, M.A.

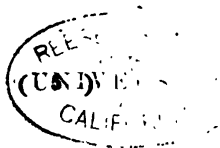
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BACON;

HIS WRITINGS, AND HIS PHILOSOPHY.

PART II.

BACON'S PHILOSOPHICAL WORKS.

INTRODUCTION.

ALL Bacon's philosophical writings may be reduced to the scheme of his *Instauratio Magna*—may be arranged as either parts or appendages of that work. The spacious plan of the *Instauratio*, as sketched by Bacon himself, comprehends alike those of them that were published before it was conceived or announced, and whatever he afterwards wrote.

In our examination or analysis, therefore, of these writings, we shall take them in the order in which they stand, or may most naturally be placed, in the *Instauratio*; but it will be convenient, for clearness of reference, that we also enumerate here the successive dates at which they were severally published.

The 'Fragment of the Colours of Good and Evil,' otherwise entitled 'Places of Persuasion and Dissuasion,' was published, with the first edition of the *Essays*, in 1597. This tract, as we shall find, has been incorporated by Bacon himself in the *De Augmentis Scientiarum*, or First Part of the *Instauratio*.

The 'Two Books of the Proficiency and Advancement of Learning,' were published in English in 1605. They were afterwards expanded by the author into the Nine Books of the Latin Treatise *De Augmentis Scientiarum*.

The Latin treatise 'De Sapiencia Veterum' (Of the Wisdom of the Ancients), of which an account has already been given among the Moral Works, may also be noticed here, as being in part incorporated with the *De Augmentis Scientiarum*. It was published by itself in 1610.

2 The 'Novum Organum Scientiarum,' forming the Second Part of the *Instauratio*, was published in Latin in 1620. It was accompanied not only by its own proper Preface, but also by a Preface and other Prolegomena to the entire *Instauratio*, including, in particular, what is entitled the *Distributio Operis*, or exposition of the Six Parts of which that great work was to consist. This was the first announcement of the *Instauratio Magna*.

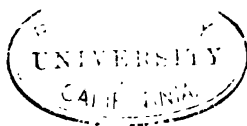
3 In 1622 was published a portion of the Third Part of the *Instauratio*, under the title of 'Francisci Baconis de Verulamio, Vice-Comitis Sancti Albani, Historia Naturalis et Experimentalis ad Condendam Philosophiam; sive Phænomena Universi: Quæ est Instauracionis Magnæ Pars Tertia.' It consisted of the 'Historia Ventorum' (History of the Winds), with the *Aditus*, or Prefaces, of five other similar histories.

This volume was followed in 1623 by the 'Historia Vitæ et Mortis' (History of Life and Death), another of the Six Histories intended to compose the Third Part of the *Instauratio*.

4 In the same year, 1623, was published the entire treatise 'De Dignitate et Augmentis Scientiarum' (On the Dignity and Advancement of the Sciences), in Nine Books; being a translation into Latin and expansion of the Two Books of the *Advancement of Learning*, and forming the First Part of the *Instauratio*. This was the last portion of the *Instauratio* published by Bacon himself.

In 1627, after Bacon's death, his chaplain, Dr. Rawley, published the Ten Centuries of his 'Sylva Sylvarum, or Natural History,' in English, designed to form another portion of the Third Part of the *Instauratio*. It had been prepared for the press, and Rawley's Preface to it had been written, before the death of the author.

In 1653 Isaac Gruter published at Amsterdam, in a



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duodecimo volume of about 500 pages, a collection of what he called the Writings of Bacon in Natural and Universal Philosophy—‘Francisci Baconi de Verulamio Scripta in Naturali et Universali Philosophia’—all, as he states, new to the world, and copied from manuscripts carefully corrected by the author, and bequeathed by him to the care of the most noble William Boswell, that is, Sir William Boswell, minister or agent of James I. and Charles II. in Holland. And it is true that in his will Bacon, after directing his executors, and especially Sir John Constable, and his “very good friend, Mr. Bosvile,” to take care that of all his writings, meaning his printed works, both English and Latin, there may be books fair bound and placed in the king’s library, and in the libraries of the University of Cambridge, and of Trinity College, and of Bennett College, and of the University of Oxford, and of the Archbishop of Canterbury, and of Eton College, adds; “Also I desire my executors, especially my brother Constable, and also Mr. Bosvile, presently after my decease, to take into their hands all my papers whatsoever, which are either in cabinets, boxes, or presses, and them to seal up until they may at their leisure peruse them.” Nevertheless, most of the pieces printed by Gruter are, from whatever cause, extremely inaccurate; and some of them are evidently only the first drafts of what we have elsewhere in a more perfect form. Of several, however, we have no other original copies.*

In the First Part of the collection entitled ‘Resus-

* Three Letters from Gruter to Rawley are published by Tenison, with translations, in the *Baconiana*, pp. 221—241. In the first, dated from the Hague, 29th May, 1652, he says:—“I send you here a catalogue of those writings which I had in MS. out of the study of Sir William Boswel, and which I now have by me, either written by the Lord Bacon himself, or by some English amanuensis, but by him revised; as the same Sir William Boswel (who was pleased to admit me to a most intimate familiarity with him) did himself tell me.” “These,” Tenison notes, “were the papers which J. Gruter afterwards published under the title of *Scripta Philosophica*.”

citatio,' published by Rawley in 1657, one piece occurs which may be reckoned among Bacon's Philosophical Writings, his 'Letter and Discourse to Sir Henry Savill touching Helps for the Intellectual Powers.'

In 1658 Rawley published a collection of Bacon's Posthumous Works, under the title of 'Opuscula Varia Posthuma, Philosophica, Civilia, et Theologica, Francisci Baconis, &c., nunc primum edita;' which contained several philosophical treatises not previously printed, and also more perfect copies of some of those edited by Gruter.

A tract in English entitled 'Articles of Enquiry touching Metals,' &c., appeared along with an edition of the 'Sylva Sylvarum' in 1662; the publisher, William Lee, who is the same by whom all the editions both of the *Sylva* and of the *Resuscitatio* had been brought out, stating at the end that he had received it some months before from Rawley corrected for the press. And perhaps a few other short discourses may have first got abroad at various times in similar pamphlets, which are now unknown or difficult to be procured. "If it be objected," says Rawley, in his Preface to the First Part of the *Resuscitatio*, "that some few of the pieces whereof this whole consisteth had visited the public light before, it is true that they had been obtruded to the world by unknown hands, but with such scars and blemishes upon their faces that they could pass but for a spurious and adulterine brood, and not for his lordship's legitimate issue; and the publishers and printers of them deserve to have an action of defamation brought against them by the State of Learning for disgracing and personating his Lordship's works."

Of Archbishop Tenison's collection, entitled 'Baconiana, or Certain Genuine Remains of Sir Francis Bacon, &c., now the first time faithfully published,' which appeared in 1679, one division consists of 'Physiological Remains,' or 'Arguments appertaining to Natural Philosophy,' and another of 'Medical Remains.'

Finally, a few additions were made to this portion of Bacon's works by the publication, in 1734, of 'Letters

and Remains of the Lord Chancellor Bacon ; collected by Robert Stephens, Esq., late Historiographer Royal ; or, as the title runs in the second edition, published in 1736, ' Letters, Memoirs, Parliamentary Affairs, State Papers, &c., with some curious pieces in Law and Philosophy ; published from the Originals of the Lord Chancellor Bacon.' This is commonly called Stephens's second collection ; his first, published in 1702, being entitled ' Letters of Sir Francis Bacon, &c., now collected, with an Historical Introduction ;' or, in the second edition, published in 1736, ' Original Letters and Memoirs, written by the Lord Chancellor Bacon during the reign of King James I. . . . collected and published, with remarks, by Robert Stephens, Esq., late Historiographer Royal : to which is prefixed a large Historical Introduction.'

SECTION I.

PROLEGOMENA TO THE INSTAURATIO MAGNA.

THE ' *Novum Organum*, ' or Second Part of the *Instauratio*, when first published in 1620, was accompanied, as has been stated above, by certain preliminary announcements, which, however, were evidently intended to be introductory to the entire *Instauratio Magna*. They are four in number, and are eminently deserving of our attention before entering upon the perusal of the work which they precede and usher in.

First there presents itself a brief but solemn and striking proclamation of the general design of the work, headed, ' *Franciscus de Verulamio sic cogitavit, talemque apud se rationem instituit; quam viventibus et posteris notam fieri ipsorum interesse putavit* ' (Francis of Verulam thus thought, and proceeded in considering things in his own mind after this manner; which he deemed that it concerned both his contemporaries and posterity that they should be made acquainted with). It commences thus, to adopt a translation slightly modified from the old one by Gilbert Wats, which, although disfigured by some affectation or pedantry, is both closer to the original and more expressive than that of Dr. Shaw:—" Seeing it was manifest to him that the human understanding creates itself much trouble, nor makes an apt and sober use of such aids as are within the command of man; from whence infinite ignorance of things, and from the ignorance of things innumerable disadvantages; his opinion was, that with all our industry we should endeavour, if haply that same commerce of the mind and of things (than which a greater blessing can hardly be found upon earth, at least among earthly felicities) might by any means be entirely

restored, or at least brought to terms of nearer correspondence." This, then, we are to keep in remembrance, is the great purpose of the author:—to restore, or rather to establish that "*commercium mentis et rerum*,"—that direct intercourse between the mind and things—by which alone he conceives we can ever rightly understand and turn to proper account the natural forces and capabilities by which we are surrounded.

He goes on to observe that he had no hope at all that the prevailing errors would rectify themselves, either by the inherent power of the understanding or by the aid of dialectic, or logic; because the primary notions which the mind was wont almost passively and supinely to drink in, and from which all others spring, were unsound, confused, and rashly abstracted from the realities to which they relate; while there was the like luxuriant variety and inconstancy in the second and sequent notions; so that it came to pass that the whole system of reasoning which men employed in the inquisition of nature was not well put together and built up, but was merely a showy pile without any sound foundation. For, whilst men admired and celebrated the imaginary powers of the mind, her true faculties, such as they might be made, if due aids were made use of by her, and she were to carry herself complyingly towards things instead of insulting over them, were passed over and allowed to lie unused.

"This one way, therefore," he concludes, "remaineth, that the whole business be attempted anew with better preparations, or defences against error; and that there be a universal *INSTAURATION*, or re-construction, of the arts and sciences, and of all human learning, upon a due basis." That is the meaning of the word *Instauratio*: it was used by the Romans for the repetition of anything; and generally with a special view to correctness or completeness of performance; as, for instance, of games or sacrifices of which the first performance had been unsatisfactory. It is properly a building up, and is nearly the same thing with a restoration.

Of what remains of this preliminary intimation of the

design of the *Instauratio* the following are the most remarkable passages:—"It does not escape him how untrodden and solitary is the way of this experiment, and how hard it may be for him to win belief in its practicability. Nevertheless, he thought that he ought not to desert either the undertaking or himself, but should at least make trial of entering upon the road which alone is pervious and penetrable to the mind of man. . . . And being uncertain when these things might hereafter come into any other mind, led principally by this consideration that he had heard of no one hitherto who had applied himself to such cogitations, he determined to publish by themselves such portions of his design as he had been enabled first to finish. . . . Assuredly he esteemed any other ambition whatsoever as inferior to what he had thus taken in hand; for this which is here treated of either is nothing, or is so great that he may well be contented with the merit of that alone and seek for nought beyond it."

Then follows a Dedication to the King, James I. This address can in strictness be understood as referring only to the *Novum Organum*, which alone accompanied it when it first appeared; but it is sufficiently applicable also to the whole of the *Instauratio Magna*. What Bacon proposed as his new method, although recommended and illustrated in other parts of the *Instauratio*, is only formally propounded or explained in the *Novum Organum*. It is there that what he conceives to be the novelty of his general views or principles is chiefly to be found. In any circumstances, therefore, his preparatory observations on his main design would have had a special reference to that part of the work.

What he offers, he tells his majesty, is at least altogether new; new in its very kind; yet copied, he adds, from a very ancient original, namely, from the world itself and the nature of things and of the human mind. He has himself been accustomed to esteem the work as the offspring rather of time than of wit; for the only thing wonderful in it is, that the first conception of the truths it contains, and such strong suspicions respecting

the opinions which have hitherto prevailed, should come into any one's head ; after that, the rest followed naturally. Afterwards he expressly describes his work as a new torch kindled amid the darkness of philosophy to be a light to all coming time, and as a regeneration and instauration of the sciences. What he has put into men's hands, however, he remarks in conclusion, is the organ or instrument ; the materials on which it is to be employed must be sought from things themselves.

Next we have a Preface of considerable length, headed "On the State of the Sciences, that it is not prosperous nor greatly advanced ; and that another way altogether than what hath been heretofore known must be opened to the human understanding, and other helps obtained, in order that the mind may be able to exercise its right over the nature of things."

"It seems to us," he begins, "that men neither properly understand what acquisitions they have made, nor what powers they are endowed with ; the former they overrate, the latter they underrate. And so it comes to pass, that, either holding such arts as are generally known and practised in an immoderate estimation, they seek nothing more ; or, undervaluing themselves beyond what in equity they ought, they waste their powers upon things of lighter significance, and refrain from making trial of them in such a way as might be really to the purpose." It is, as usual, impossible to abridge what follows ; the compactness of the statement sets any such attempt at defiance ; all that can be done is to extract a few of the leading remarks, omitting the connexion, or leaving the reader to make it out for himself. Here then are the passages, not which are the most ingenious or brilliant, but which are most material for the understanding of the author's design, and of his own conception of what he had accomplished in the work the principal portion of which he now laid before the world :—"As for the utility or profitableness of existing knowledge, we must speak out plainly, and declare that our philosophy, which we have derived principally from the Greeks, seems to be but a childhood of knowledge, and

to have the qualities of childhood, as being apt for idle talk, but impotent and immature for generating any thing; for it is of controversies rank and fertile, but of works barren and fruitless. . . . If this sort of wisdom were not altogether a lifeless thing, it is evident that that could never have happened which now for many ages hath continued; that the sciences thence resulting should thus stand still, in a manner immoveable in their first footsteps, without any augmentation worthy of the human race; to such a degree, that not only assertion remains assertion, but even question remains question, and is not determined by disputation about it, but fixed and nourished; and that all tradition and succession of discipline represents and exhibits the persons only of teacher and hearer, not of inventor and of another adding something of note to what his predecessor has invented or discovered. In the mechanic arts we see the contrary thing to happen: they, as if they drank in some life-inspiring breeze, daily increase, and are perfected; and, appearing for the most part rude, and even burthensome and shapeless, in the hands of their first authors, in course of time acquire new virtues and a certain adaptation or serviceableness, so that the wishes and desires of men sooner fail and change than those arts arrive at their height and perfection. Philosophy, on the contrary, and the intellectual sciences are, like statues, adored and celebrated, but are not carried forward; nay, commonly, they are of most vigour when first produced, and ever after go on degenerating. . . . Let no one affirm that the sciences, increasing by degrees, have at length come to a certain full stature, and have at last, as having finished the course allotted to them, fixed themselves in the works of some few authors; so that now nothing better can be found out, and it only remains that what has been invented should be cultivated and adorned. It were to be wished, indeed, that such were the case. But the more correct and the truer account is, that this enslaved condition of the sciences is nought else than a thing bred from the audacity of a few, and the sloth and pusillanimity of the rest of mankind. For as soon as any particular science has in parts been some-

what diligently tilled and laboured, some one has usually arisen, confident in his talent, and accepted and celebrated on account of the compendiousness of his method, who in so far as regards appearances has established the art, but in reality has corrupted the labours of his predecessors. Yet what he has done is wont to be well-pleasing to succeeding generations on account of the easy utility of his work, and their wearisomeness and impatience of renewed inquiry. And if any one be moved by the inveterate agreement of opinions, as if it were the verdict of time, let him know that he leans upon a very weak and fallacious consideration. For we are in great part ignorant even of what has been made known and published abroad in the several arts and sciences at various times and places; much more of what individuals have attempted and thought of in private. So that neither the births nor the abortions of time stand recorded in any patent and authentic register. Nor is general consent and its long continuance, to be held of so much importance. For, however various may be the kinds of civil polity, there is but one political state of the sciences, and that always has been, and always will be, democratic. And with the people the doctrines that most flourish are ever either contentious and pugnacious, or specious and vain; such, that is to say, as either ensnare assent or win it by blandishment. And so, without question, the greatest wits in every age have been overborne, and in a sort tyrannized over; whilst men of capacity and comprehension above the vulgar, yet consulting their own reputation, have submitted themselves to the overswaying judgment of time and the multitude. Therefore, if in any time or place more profound contemplations have perchance emerged and revealed themselves, they have been forthwith tossed and extinguished by the winds and tempests of popular opinions; insomuch that time, like a river, has carried down to us that which is light and blown up, but sunk and drowned whatever was weighty and solid. . . . The philosophy that has been delivered down to us and generally received may for the most part be thus described:—barren as to effects, fruitful in questions;

languid and backward in growth ; presenting a show of perfection in the whole, but ill filled up in the parts ; popular in its predilections, but suspected by its authors themselves, and for that reason fortified and faced out with sundry artifices. . . . Nobody has yet been found who has rested enough upon things themselves and upon experience. And some who have committed themselves to the waves of experience, and have become almost mechanics, yet in their very experience practise a roving manner of inquisition, and do not war with it according to any certain rule. Nay, many have proposed to themselves certain petty tasks, thinking it a great thing if they can but work out some one invention, by a method not less impotent than unscientific. No one rightly and successfully teaches the nature of any thing in the thing itself ; but all, after a laborious varying of experiments, instead of finding any thing in which they can acquiesce and rest, find only matter for further inquiry. And there is one thing in especial which is not to be omitted, namely, that all the industry employed in experimenting has from the beginning caught with a too forward and intemperate eagerness at certain purposed effects ; has sought, I say, for fruit-bearing instead of light-bearing experiments ; and not imitated the divine method, which on the first day created light alone, and to that devoted one whole day, nor on that day produced any works formed of matter, but only descended to such works on the following days. The received system of dialectic, although it may be applied with perfect propriety in civil matters, and in such arts as stand upon discourse and opinion, yet is a long way from reaching to the subtilty of nature ; and, by catching at what it cannot master, has done more to confirm and as it were to rivet errors, than to open the way to truth. . . . The edifice of this universe is, in its structure, to the human intellect contemplating it, like a labyrinth ; where from all sides there present themselves so many ambiguous pathways, such fallacious similitudes of things and their signs, such oblique and interwoven windings and knots of nature ; and the journey over it is to be constantly made under the

uncertain light of the senses, sometimes shining out, sometimes hiding itself, through the forests of experience and particular facts. Nay, even the guides, as has been said, who offer themselves, are themselves perplexed, and help to increase the number of errors, and of those who err. In a case so difficult we must despair of the human judgment acting merely by its natural force, or even of achieving any thing of moment by the utmost happiness of fortune; for the victory cannot be won either by any excellence of genius, however great, or by chance experiments, however frequently repeated. Our steps must be guided by a clue; and all the way onwards, even from the first perceptions of the senses, must be secured by a certain method. . . . The ancients, indeed, showed themselves admirable in those things which depend upon genius and abstract meditation. But, as in former ages, when men in navigating used to direct their course only by their observation of the stars, they were indeed able to coast the shores of the old continent, or to cross some of the minor inland seas; yet before the ocean could be crossed, and the regions of the new world discovered, it was necessary that the use of the mariner's needle, as a more trusty and certain conductor, should have become known; even so, those things which heretofore have been found out in the arts and sciences are of such sort that they might have been arrived at by practice, meditation, observation, and discussion, as being nearer to the senses, and lying almost immediately under common notions; but before we can make our approaches to the more remote and hidden things of nature, it is of necessity required that a better and more perfect use and operative application of the human mind and intellect be introduced. . . . All who before ourselves have applied themselves to the discovery of the arts, after having only for a little while turned their eyes upon things, and instances, and experience, then straightway, as if invention were nothing more than a certain process of excogitation, have fallen as it were to invoke their own spirits to utter oracles to them. But we, modestly and perseveringly keeping ourselves conver-

sant among things, never withdraw our understanding hence for a longer space than is sufficient to allow the images and beams of things (as happens in the senses) to meet and concentrate;* whence it happens that not much is left to mere strength and excellence of wit.... And in this manner we believe that we have established for ever a true and legitimate marriage between the empiric and rational faculties, whose sullen and inauspicious divorce and separation has thrown all things into confusion in the family of mankind."

Even through the medium of a translation, and in the otherwise imperfect form in which we have been obliged to present it, the extraordinary merit of this Preface to the *Instauratio Magna* as a piece of writing will be felt by every reader. In ingenuity and eloquence, in life and pregnancy of style, in richness and beauty of illustration, and in easy strength of execution, it may vie with anything else that we have of Bacon's. But notwithstanding the large proportion of truth which it unquestionably contains, is its philosophic soundness equal to its rhetorical brilliancy?

Bacon, we apprehend, in all his speculations upon the

* That is, apparently, to meet and arrange themselves into a distinct representation in the understanding, in the same manner as they do when conveying impressions to the senses. According to this interpretation the images and beams, or rays, both express nearly the same thing—the emanations figuratively supposed to proceed from objects by which they make themselves to be perceived by the senses and the mind. The original is:—"Nos vero—intellectum longius a rebus non abstrahimus quam ut rerum imagines et radii (ut in sensu fit) coire possint." Mr. Wood's translation in Mr. Montagu's edition is; "We abstract our understanding no further from them [things] than is necessary to prevent the confusion of the images of things with their radiation, a confusion similar to that we experience by our senses." But this is plainly the very opposite of what the Latin states. *Ut possint coire* can never mean "to prevent the confusion." Even if the *imagines* and the *radii* are to be understood as different, the translation of the clause must be, that they *may* come together, not that they *may not* be mingled or confused.

subject here and elsewhere, confounds two things which are quite distinct in their nature—the method of invention or discovery, and the exposition or theory of the method,—and attributes an efficiency to the latter which in reality belongs only to the former. It is a common fallacy. As Bacon's *Novum Organum* is conceived to have first taught the art of discovery, so the old *Organon* of Aristotle is very generally supposed to have first taught men the art of reasoning. But the incontrovertible fact is, that men reasoned just as well before the time of Aristotle as they have done since. What his *Organon* taught or expounded was not the art but the science of reasoning; that is to say, it investigated what reasoning was, and reduced its formulæ to a system. It no more taught or could teach the art of reasoning than his treatise on the *Poetical* taught or could teach the art of writing poetry; or than La Place's *Mécanique Céleste* can be said to teach the art of constructing the heavens.

The system of the heavens, the nature of poetical thought and expression, the laws according to which the mind reasons, are all nearly alike removed from the class of things that can be inculcated by precept. They are subjects for scientific examination, not for being taught as arts. Of the three cases, that of the writing of poetry, as involving the observance of certain forms which are in some degree traditionary or conventional, and admit of being specified and reduced to rules, is the only one in which anything properly called an art is possible. And several Arts of Poetry have been written. But has any man ever been made a poet by studying an Art of Poetry? Has better poetry been written since poetry was made an art than before? The truth is, that all that an art of poetry can teach has nothing more to do with what really constitutes poetry than sweeping in the hearth has with making the fire to burn.

As for the art of reasoning, it is as great an absurdity to talk of such an art as it would be to talk of the art of falling through the air when a man has been thrown out of a window. There is but one way of reasoning. That is to say, a given mind in a given state can reason only in

one way. To take the common example, let a person believe or understand that all men are mortal, and also that John is a man, and he cannot help performing the act of reasoning, which consists in inferring from these two statements, called premisses, the conclusion that John is mortal. No art is required to teach him to do this, as no discipline to which his mind could be subjected could possibly prevent him from doing it. He is without power to do otherwise. And so it is in every other case in which an act of reasoning is performed.

Do all minds, then, reason equally well? In the strict sense of the term *reason*, they do. Let any two minds equally well apprehend the propositions which form the premisses of a syllogism, and they will infallibly draw from them the same conclusion. The conclusion is, in fact, nothing else than the new form which one of the premisses necessarily assumes as soon as it is viewed along with the other. It assumes this new form to the mind by a law of nature as irresistible as that by which a visible object changes its colour to the eye according to the colour of the light that is made to fall upon it; or of the medium through which it is seen.

Logic does not undertake either to supply the power of comprehending the premisses of a syllogism where it is wanting, or to direct the mind in the selection of the premisses from which it is to draw its conclusions. It does not concern itself at all with the premisses—not even with the question of their truth. All men are *immortal*; John is a man; therefore John is *immortal*; that is as correct a syllogism, or as good logic, as the example asserting the opposite, which is commonly given.

Yet in the soundness and judicious selection of the premisses lies all the practical value of any reasoning. The difference in knowledge and capacity between two minds will never be indicated by their disagreeing as to the conclusion to be drawn from the same premisses, when equally well understood by each; but it will be indicated by the one comprehending the premisses more readily or more correctly than the other, or by the one admitting the truth of premisses which the other doubts.

or rejects, or, most decisively of all, by the fortunate points of view and courses of inquiry which are adopted by the one and which do not suggest themselves to the other. But of all this logic takes no account.

The utmost that logic can do is to make a single deduction. When the syllogism is completed, its function is performed, its power is gone. In the common example quoted above, when we have arrived at the conclusion that John is mortal, we cannot by any aid of logic advance another step. Among all its formulæ there is not one that will help us over another inch of ground. If we would carry the speculation further, it must be done by a mental act, which is altogether out of the province of logic, the introduction of a new premiss. It is in the selection of that premiss that the real ability of the reasoner is shown, and that all the value and success of the reasoning consists. As for the conclusions of the successive syllogisms, they are, in moral speculation at least, most commonly not even set down; they are left for the reader to deduce for himself; it is held to be sufficient that he is supplied with the premisses by which they may be suggested, or rather in which they are involved.

But not only is the invention or selection of his premisses, upon which it thus appears that all the success of the reasoner or speculator depends, a thing that is not taught or pretended to be taught by logic; it is manifestly a thing not to be taught at all. It is no more to be taught than the writing of poetry is to be taught. That which alone distinguishes one man from another in ratiocinative speculation, beside what difference there may be between them in their knowledge of the subject, is the difference of the degrees in which they are gifted with quickness, clearness, and comprehensiveness of mental vision—which are qualities as unsusceptible of being communicated by precept as is the quality of being six feet high.

Now what Bacon calls invention or discovery in the arts and sciences is merely a mode of ratiocinative speculation. Such speculation may be carried on by words or

without words—by propositions or by experiments. It is the same mental power working with different instruments, or upon different materials. It is equally in the one case as in the other a power evidently incommunicable by teaching, and which no exposition of its nature or manner of operation can ever convey to him who has it not. It is not of the nature of a spade, or a musquet, or an algebraic formula, or of any thing else which can be put into men's hands as an *organum*, or instrument.

Without questioning the truth of the doctrine preached by Bacon, that it is from the observation and examination of things that science must begin, we deny that the promulgation of this truth, however new it might have been as a proposition, was giving men any *novum organum*, or new instrument of discovery. The practice of the method which he asserts to be the only one by which discoveries can be made, and his assertion, or demonstration if you will, to that effect, have no necessary connexion. Although the assertion had never been made before, the practice may have been going on from the beginning of the world. Indeed, the assertion itself implies the previous existence of the practice; unless it is to be held that no discoveries whatever had been made in the arts and sciences, except perhaps by accident, until Bacon arose.

Exactly the same doctrine that Bacon has laid down for science and philosophy has also been announced, and in our own day generally accepted, as the true faith in poetry. Here too it has been proclaimed that nothing is to be done without the study of the realities of nature—that nature is the supreme rule and standard—that “the art itself is nature.” After some generations in which poets had been more accustomed to look to certain great masters than to this greater mistress, they have been recalled, or rather they have returned, to their true allegiance. For in every such case of the establishment of juster and higher views in any department of intellectual pursuit, the practice precedes the preaching. The better faith always shows itself in production before it takes the form of proposition. It was the poets who

taught the critics here, not the critics who taught the poets. But what critic or theorist ever imagined that, in inculcating what we may call the new doctrine as to this matter, he was putting into the hands of men any thing of the nature of a new organ or instrument? So far from that, the doctrine itself involved the very opposite admission or affirmation. If its account of the nature of poetical production was correct, the practice of the doctrine could be no novelty, whatever the formal statement of it might be ; for whatever true poetry had any where been produced was a proof of the practice having been followed. And neither in poetry nor in philosophy could any theory of the method of invention, however correct or complete, communicate any thing of the faculty of invention. It might as reasonably have been expected that the announcement of the true theory of the circulation of the blood would work some great and general improvement in the beating of people's pulses.

Accordingly, in point of fact, the exercise of the inventive faculty, either in poetry or in science, has clearly never been affected by the prevalent state of criticism or the philosophy of method, or by the views in these departments of speculation which may have been entertained by the individual poet or scientific inventor. The poetry that is fullest of invention, fullest of reality and of life, was produced before the birth of criticism ; and it never has been pretended that the invention of any of the greatest poets of any age has been quickened or strengthened by the critical theories of their time. Nobody has dreamed of calling Aristotle the Father of Poetry because he wrote a treatise upon the Poetical ; although, if no poetry of earlier date had been preserved, this title would doubtless have been claimed for him, and we might possibly have been assured that no poetry would have been produced down to the present hour if that treatise of his had not been written. Such a claim would not have been more preposterous than that which is set up for Bacon as having been the Father of Modern Science. From causes, some of which he has himself explained in this Preface to the *Instauratio*, the spirit of

independent investigation had for many centuries given way in every department of thought before the spirit of submission to authority and acquiescence in dogmas and creeds of old establishment. It was not more the case in science than in literature. Even for a considerable time after what is called the revival of letters in the fifteenth century, the imitation of the ancient models was the only thing attempted or dreamed of by the most aspiring genius. The habit of thought was universal; in every thing men looked only to the mighty and glorious past. And the immense superiority of that past might almost be said to justify them; it was little to be wondered at that the writers and philosophers of classic Greece and Rome should be looked back to as almost a race of superior beings by all the generations that had succeeded them. Least of all was a thought of questioning their authority likely to occur to that generation upon whom the sunlight of their genius first re-emerged in full effulgence from the clouds that had obscured it for a thousand years. But by the time that Bacon's great work appeared, in the early part of the seventeenth century, this all-believing reverence for antiquity had long begun to pass away. The true spirit of scientific inquiry had fairly re-awakened, and discoveries which had already wrought a complete revolution in physical science had been made by Copernicus, by Tycho Brahe, by Kepler, by Galileo, by Bacon's own countryman Gilbert, and others. Bacon, indeed, does not appear to have been aware of this; he speaks with contempt repeatedly of the new views both of Gilbert and of Copernicus; the others, we believe, he nowhere mentions. But that makes no difference: it is indisputable that the very thing which he is supposed to have been the first to teach, men were already busy doing in all directions. And of the illustrious succession of inventors and discoverers who have since appeared in every department of the field of science, it is equally certain that very few, if any, have either been distinguished as students of Bacon's writings, or can reasonably be supposed to have even indirectly acquired much knowledge of the spirit or principles of what is

called his method. Where is the case in which it can be clearly or even probably made out that any discovery of mark has been arrived at through that method, followed more closely than it would necessarily have been in the particular instance although Bacon had never expounded it or had never lived? If the history of all the great inventions and discoveries of the last two hundred years were to be traced, we doubt if the proportion of them that would be found to be fairly attributable to the inspiration of Bacon would turn out to be much more considerable than that of the great poems of the last two thousand years that may be attributed to the inspiration of Aristotle.

The Preface to the *Instauratio Magna* is followed by a longer discourse entitled *Distributio Operis*, or The Distribution of the Work. It consists, or rather will consist, it is intimated, of Six Parts; entitled, the 1st, *The Partitions, or Divisions, of the Sciences*; the 2nd, *The Novum Organum* (that is, The New Organ or Instrument), or Directions respecting the Interpretation of Nature; the 3rd, *Phenomena of the Universe*, or Natural and Experimental History for the building up of a Philosophy; the 4th, *The Scala Intellectus* (or Ladder for the Understanding); the 5th, *Prodromi* (that is, Precursors), or Anticipations of the Second Philosophy; the 6th, *The Second Philosophy*, or Active Science. We will translate so much as will suffice to explain what the author contemplated setting forth under each of these divisions:—

“The First Part exhibits the sum, or universal description, of that knowledge or doctrine in possession of which the human race is up to this time. . . . And our Partitions include not only those things that have been found out and are known, but those also which have been hitherto passed over and may be said to be owing. . . . And it will be our constant care to subjoin either instructions for the supplying of such deficiencies, or even sometimes a portion of the work completed by ourselves, by way of example for the whole. For we have undertaken, not to measure out regions in our mind, like augurs

for the purpose of taking the auspices, but to enter them as military commanders with the design of doing actual service.* And this is the First Part of the work.

“Next, having been carried through the ancient arts, we will prepare the human intellect for passing onward. Accordingly what is assigned to the Second Part is the doctrine respecting a better and more perfect employment of the reason in the investigation of things, and respecting the true helps of the understanding; in order that thereby (in so far as the condition of humanity and of mortality allows) the understanding may be exalted, and endowed with more ample powers for conquering the steepes and obscurities of nature. And that art which we adduce (and which we are wont to call the interpretation of nature) is a kind of logic; although the difference between it and the common logic is very great, and may indeed be described as something passing measure. For that vulgar logic also indeed professes to contrive and furnish helps and guards for the understanding; and in this alone they agree. But that which we bring forward plainly differs from the vulgar, principally in three things; namely, in its end, the order of demonstration, and the beginnings of the inquisition.

“For the end which this science of ours proposes is, to find out not arguments, but arts; and not what may be accordant with principles, but principles themselves; and not probable reasons, but designations, and indications of effects. And so from a different purpose follows a different result. For there an adversary is vanquished and constrained by disputation; here nature by operation.

“And with the diverse ends agree the nature and order of demonstration in the two. For in the vulgar logic almost the whole labour is spent about the Syllogism. Respecting Induction the dialecticians seem to have

* The Latin is, “ut duces, promerendi causa.” Mr. Wood’s translation—“like generals to invade them for conquest”—is hardly authorized by the original. It seems to be founded upon that of Wats—“as captains to invade them for a conquest.” Shaw omits the passage.

scarcely ever seriously thought; merely passing it over with slight mention as they hasten on to their formulas of disputation. But we reject demonstration by syllogism, as proceeding too confusedly and allowing nature to escape from our hands. For, although it cannot be doubted by any one that those things which agree in the middle term, agree also with one another (which is a sort of mathematical certainty), nevertheless there is this of fallacy in the method, that the syllogism consists of propositions, the propositions of words, and that words are but the tokens and signs of opinions.*. . . . We therefore reject the syllogism; and that not only with regard to principles (to which the logicians themselves do not apply it), but with regard also to middle propositions; which indeed the syllogism in some way or other educes and brings forth; but they are such as are barren of effects, and remote from practice, and plainly unsuited to the active part of the sciences. Although, therefore, we leave to the syllogism, and to such celebrated and applauded demonstrations, the jurisdiction over popular arts and those that depend upon mere opinion (for in that department we stir nothing), yet for inquiring into the nature of things we use induction throughout, for the minor propositions as well as for the major. . . .

"Wherefore also the order of the demonstration is altogether inverted. For hitherto the matter has been wont to be managed in this wise; that from the intimations of the senses and from particular objects flight is taken at once up to the widest generalizations, as if to fixed poles around which disputation may revolve; and from them other propositions are derived by means of middle terms.†. . . . But, in our method, axioms are raised up continuously and step by step, so that the most general statements are only arrived at in the last stage; and these most comprehensive generalizations, moreover, come out, not notional, but well defined, and such as

* "*Notionum tesserae et signa.*" Both Wats and Mr. Wood have "of things."

† "*Per media.*" Mr. Wood translates "intermediately."

nature really acknowledges to be known to her, and as enter into the very marrow of things.

“ But by far the greatest work which we set in motion is in the form of the induction, and in the conclusion which is attained to by means of it. For that form, of which the dialecticians speak, which proceeds by mere enumeration, is a puerile thing, precarious in its conclusions, exposed to danger from any contrary instance, and occupying itself only with matters generally known ; nor does it lead to any result. But science requires an induction of such a form as may solve and separate experiments, and by means of due exclusions and rejections may bring out conclusions which shall be necessarily true. . . .

“ Nor is even this all. For we carry down the foundations of the sciences to a greater depth, and construct them with greater solidity, and begin our investigations from a higher point, than has been hitherto done ; subjecting to examination those things which the vulgar logic takes on trust. . . . We have resolved that true logic should force even supposed first principles to give reasons for themselves, until they are clearly evident. And, in so far as respects the first notions of the understanding, there is no one of those things which the understanding, left to itself, has collected, but is held by us in suspicion. . . . Nay we sift in many ways the information of the senses themselves. . . . To obviate the risks thence arising, we have with much and faithful service sought and collected helps for the senses from all quarters ; that substitutions may make up for their deficiencies and rectifications for their variations. Nor do we attempt that so much by instruments as by experiments. For the subtilty of experiments is far greater than that of the senses, assisted even by the most exquisite instruments ; we speak of such experiments as are skilfully and artistically imagined and applied in accordance with the design of the inquiry.

“ Such are the means which we prepare for the kindling and immission of the light of nature ; and they might of themselves be sufficient if the human under-

standing were quite plain, and resembled a smoothed table. But, seeing that the minds of men are so wonderfully beset, that a clear and polished surface for receiving the true rays of things is altogether wanting, a necessity arises that we should seek a remedy for this also.

"The spectres by which the mind is pre-occupied are either adscititious or innate. The adscititious have made their way into the minds of men either from the assertions and sects of the philosophers, or from the perverse rules which have been laid down for demonstrations. But the innate are inherent in the nature of the understanding itself, which may be shown to be much more prone to error than the senses. . . . And the two former kinds of spectres may with difficulty be eradicated; the latter not at all. All that can be done is, to indicate them. . . . Wherefore this doctrine of the purifying of the understanding, that it may be fitted for the reception of truth, is reduced to three reprehensions; the reprehension of philosophies, the reprehension of demonstrations, and the reprehension of the natural reason of man. . . . And this is the Second Part of the work.

"But it is our intention not only to point out and prepare the ways, but also to enter upon them. The Third Part of the work, therefore, comprehends the phenomena of the universe; that is, experience of every kind, and such a natural history as may serve for a foundation on which to rear a system of philosophy. For no manner of demonstration, or form of interpreting nature, however excellent for defending and sustaining the mind from error and failure, can also provide and supply it with the material of knowledge. But by all who would not guess and divine, but discover and know, and who desire not to invent buffooneries and fables about worlds,* but to inspect, and as it were to dissect, the nature of this real world, all knowledge must be sought from things

* This, which is Mr. Wood's translation, appears to be the best that can be given of "*simiolas et fabulas mundorum comminisci*." But the word *simiolas* is, we believe, unknown to the Latin language.

themselves. Nor can any substitution or compensation of wit, or meditation, or augmentation, suffice in the stead of this labour, and inquisition, and perambulation of the world; not if all the wit of all men were to combine for the purpose. The labour, therefore, must be undergone, or the undertaking for ever abandoned. . . . It would be of no use to smooth the mirror if there were nothing for it to reflect. . . . But our natural history also, like our logic, differs in many respects from that which is generally received; in its end or office, in its very structure and compilation, in its nicety, finally, in its selection, and the order in which it is arranged in reference to what follows it.

“For, in the first place, we propose such a natural history as may not so much amuse by variety of matter, or even profit by present fruit of experiments, as shed light upon the discovery of causes, and yield the first milk for the nursing of philosophy. . . .

“And as for the compilation, our history will be not only that of nature in a state of freedom and ease, when, that is to say, she flows on and performs her work spontaneously—such as is a history of the celestial bodies, of meteors, of the earth and sea, of minerals, plants, and animals; but much rather of nature constrained and vexed, that is, when she is thrust down from her proper state, and pressed upon and made to take a new form, by the art and ministry of man. . . .

“Nor do we present the history only of bodies, but we have besides thought it right to exert our diligence to prepare separately also a history of properties themselves; of those, we mean, which may be deemed to be as it were cardinal in nature, and in which the first elements of nature plainly reside, as being matter in its first passions and desires; namely, density, rarity, heat, cold, consistency, fluidity, gravity, levity, and many more. . . .

“After having thus guarded the understanding with the surest helps and protections, and prepared with most severe selection a complete host of divine works, it may seem that nothing more remains but that we proceed at once to philosophy itself. Yet in a matter so arduous

and doubtful it appears requisite that some things should be interposed;* partly for the purpose of instruction, partly for present use. Of these the first is, that some examples be offered of investigation and discovery according to our system and method. . . . We speak now of such examples only as may be of the nature of types and models, placing as it were before our eyes the whole process of the mind, and the continuous frame and order of discovery in particular subjects, and they various and of note. . . . To examples of this kind, therefore, we devote the Fourth Part of our work; which in fact is nothing else than a particular and expanded application of the Second Part.

"The Fifth Part is introduced only for a temporary purpose, until what remains can be finished. . . . It is made up of whatsoever things we have ourselves either found out, or proved, or added; and that not exclusively by the proper methods and rules of interpretation, but simply by that same exercise of the understanding which other men are accustomed to use in investigation and discovery.

"Finally, the Sixth Part of our work, to which all the other parts are subservient and ministerial, at length discloses and propounds that philosophy which is educed and constituted out of that legitimate, chaste, and severe inquisition, which we have previously taught and prepared. But to accomplish and bring to a termination this last part is a thing both beyond our strength and beyond our hopes. We hope indeed to furnish no contemptible beginning of it; the fortune of the human race will supply the end; which will be such perhaps as, in the present state of things and of men's minds, the imagination cannot easily comprehend or take measure of."

The panoramic view of his vast design which Bacon spreads out before us in this preliminary discourse, is for

* The meaning is not, as Mr. Wood gives it, "a few reflections must necessarily be *here* inserted." The "*quaedam interponenda*" are the subjects of the Fourth Part of the work, the *Scala Intellectus*.

the greater part as luminous and distinct as it is sweeping and magnificent. It will convey a complete conception to whoever will study it attentively of the general nature and object at least of the three first parts of the *Instauratio Magna*; the latter portion of the work, upon the actual composition of which the author cannot be said to have ever properly entered, seems to have floated somewhat vaguely before his own eye, and it may be said to form a distant back-ground in the picture he has here sketched. In our abstract, we have omitted much of the mere eloquence and illustration, with many ingenious, penetrating, and most felicitously expressed remarks; but we have preserved all the substance of the statement.

Bacon's adoption of the designation of a new logic, or dialectics, for his proposed method of investigating nature, and his comparison of the method with the vulgar or common logic, are sufficiently accounted for by the use that had come to be made of logical formulæ in the discussion of scientific questions. It is true that the syllogism is the universal form of reasoning, that all demonstration when fully developed and expressed must fall into one or other of the varieties of that form. The defect of the scientific reasoning of the schools, therefore, did not consist in its addictedness to syllogistic forms. The most perfect reasoning in the world, that of Euclid's Elements of Geometry, is every where a series of syllogisms. The error of the philosophy, both physical and moral, which formerly prevailed, and against which Bacon directs his attacks, lay in the employment of the syllogism for a purpose for which it was wholly incompetent; which was altogether beside its function and out of its province. A syllogism can establish no absolute truth. Its conclusion may be absolutely true: but all that the syllogism makes out, or professes to establish, is, that it is true provided the premisses are true. A syllogism is only a conditional affirmation. It is a statement that, given certain things, a certain other thing will follow. And one of the advantages which the syllogisms of geometry have is, that their premisses are all pure sup-

positions, mere conceptions which the mind forms without having to look beyond itself. We are not denying that the conceptions or suppositions are true. They have in fact the peculiar character of being such that it is impossible for the mind not to believe them to be true. But, for that matter, the Arabian Nights' Entertainments might be delivered in a series of syllogisms. Given, it might be said, so many genies, giants, and enchanters, and such and such effects will follow. The one proposition would be as true as the other; the conclusion would be true if the premisses were true; and that is all that logic can make out in any case. The old writers on science were wont to employ it as if they thought it could do a great deal more. Its proper and only function is the exposition of an argument; they seemed often to think that a correctly constructed syllogism was the sufficient explanation of a phenomenon.

At the same time Bacon is not justified in making this matter of charge against the common logic. There is usually no fault to be found with the mere logic of the ~~old scientific writers.~~ Their conclusions are legitimately deduced from their premisses; and that is all that can be required on the score of logic. The single respect in which their demonstrations are objectionable is, that they often set out from false or insufficiently established premisses; but with the establishment of premisses, as such, logic has nothing to do; its sole office is the deduction of conclusions. Its premisses are assigned to it, or may be assumed at pleasure.

It is true that a false proposition which is adopted as one of the premisses of a syllogism has often been previously obtained as the conclusion of another syllogism. But, although false as a premiss, it may have been true as a conclusion; that is to say, it may have been quite legitimately deduced from other premisses. In that case the fault of the demonstration will still be, as before, that some one or other of the premisses has been false.

The greatest amount of misconception and confusion of thought, however, in regard to these subjects, has been occasioned by Bacon's describing the method he proposes

for the investigation of natural phenomena and processes as a new logic, and designating it by the term induction. It has become common to distinguish it as the Inductive Logic.

Whatever else may be new in the Baconian method, there most certainly neither is, nor can be, any novelty in its logic. If there were, it would only be an illogical, that is, an unreasonable or absurd method. For nobody has ever pretended that the old logic is false; the worst charge that has been brought against it is that it is useless or inefficient. To talk of a new logic, differing in its principles from the old, is tantamount to talking of a new geometry, or a new species of square or circle.

But what Bacon understands by Induction is not a logic at all, or anything of the nature of a logic. Induction is the name given by the logicians to that kind of syllogism in which a universal conclusion is obtained from premisses relating to particulars, instead of a particular conclusion being derived from a universal proposition, as is more commonly the case. But the enumeration of particulars in such an induction is complete; and the conclusion, therefore, is as necessary as in the common syllogism. Thus, John, Thomas, and Henry, are each dark-haired; John, Thomas, and Henry make up all the family of the Smiths; therefore the Smiths are all dark-haired; is an example of logical induction. Bacon's induction is altogether different. In that, from a number of particular instances, examined by means of observation and experiment, and sifted by the proper rejections or exclusions, we infer, not by the necessary laws of thought (with which alone logic concerns itself), but on our experience of the uniformity of the operations of nature, on grounds of analogy, or on other such considerations, that a certain thing is probably universally true. This is not such a process as comes within the domain of logic, which, as already explained, undertakes to teach nothing more than how two propositions having a certain relation combine to generate a third, and in so teaching is entirely indifferent as to whether the generating propositions be true or false. A logical induction does not, any more than a logical deduc-

tion, look beyond the mind itself : logic is the science of a certain mental process, not the science or art of the collection and examination of material facts. Its conclusions are, in all cases, necessary and irresistible, the premisses being admitted ; and depend for their reception by the mind in no degree upon its knowledge or experience of any kind, or even upon the degree of its judgment, or capacity of weighing evidence. There is no evidence to be weighed or balanced in a syllogism, whether deductive or inductive : all the evidence is upon one side.

It is true that so much of the Baconian Induction as consists in drawing the conclusion may be resolved into a logical form, by introducing, or assuming that there is always present to the mind, as one of the premisses, a proposition asserting the uniformity of the operations of nature. In this way the major proposition will be, What is found in examined instances will be found in all instances ; the minor, A certain thing is what is found in examined instances ; the conclusion, Therefore the same thing will be found in all instances. The middle term, (that by which the two premisses are connected so long as they continue distinct, and which like a bridge becomes unnecessary, and is removed, when they are in the conclusion brought together into one affirmation) will be, What is found in examined instances. But this only proves that, in so far as the Baconian Induction is a logical process, its logic is merely the common logic. As the term is used by Bacon, however, it includes also, and that, we may say, as its principal part, another process, the collection and examination of the instances, which, as we have seen, is not a logical process at all.

SECTION II.

THE TREATISE DE DIGNITATE ET AUGMENTIS SCIENTIARUM ; FORMING THE FIRST PART OF THE INSTAURATIO MAGNA.

WHEN the treatise *De Augmentis Scientiarum* was published, by itself, in 1623, it was introduced by a short advertisement from Dr. Rawley, Bacon's chaplain, the more essential portion of which is to the following effect : —“ Since it hath pleased my lord to do me the honour of making use of my assistance in setting forth his works, I have thought that it would not be improper for me briefly to inform the reader of some things which concern this First Volume. The present treatise, on the Dignity and Advancement of the Sciences, was published by his lordship eighteen years ago, in the English language, and in two Books only ; and was addressed to his majesty, as it still is. Not long afterwards he became anxious to have it translated into Latin ; having heard that that was desired in foreign countries, and being, moreover, himself wont often to say that books written in the modern tongues would ere long become bankrupt. He now, accordingly, publishes such a translation, executed by persons distinguished for their eloquence, and revised and corrected, besides, by himself. The First Book is merely a translation, and is very little changed ; but the remaining eight, which declare the partitions of learning, and formerly made only one Book, come forth now as a new work. The principal reason which moved his lordship thus to rewrite and amplify the work was this ; that, in publishing long afterwards his *Instauratio Magna*, he appointed the *Partitions of the Sciences* to be the first part of that work ; and to be followed first by the *Novum Organum*, then by the *Historia Naturalis*, and so forth. Finding, then, the said

part relating to the Partitions of the Sciences already executed (though less solidly than the dignity of the argument demanded), he thought the best thing he could do would be to go over again what he had written, and to bring it to the state of a satisfactory and completed work. And in this way he considers that he fulfils the promise which he has given respecting the First Part of the *Instauration*." It had been noted at the end of the *Distributio*, published with the *Novum Organum*, that the First Part of the *Instauration*, comprehending the Partitions of the Sciences, was wanting; but that the said Partitions might in part be gathered from the Second Book of 'The Proficiency and Advancement of Learning, Divine and Human.'

In his Life of Bacon prefixed in English to the *Resuscitatio* (1657), and in Latin to the *Opuscula Posthuma* (1658), Rawley speaks of the translation of the 'Advancement of Learning' into Latin somewhat differently from what he does in this advertisement. In the English Life, in enumerating in their order the "books and writings, both in English and Latin," written by Bacon after his retirement, he merely mentions the "*De Augmentis Scientiarum*, or *The Advancement of Learning*, put into Latin, with several enrichments and enlargements," as if the translation had been wholly Bacon's own. In the Latin Life he expresses himself more emphatically: in there noticing the *De Augmentis* he describes it as a work which the author bestowed much labour in turning from English into Latin by his own exertions, or as the phrase might almost be rendered, without assistance;—"in quo e lingua vernacula, proprio Marte, in Latinam transferendo honoratissimus auctor plurimum desudavit." We must probably, however, understand the meaning of the worthy chaplain to be only that the translation was in part done by Bacon himself; and his words, in truth, strictly taken, do not assert more. In the *Resuscitatio* Rawley has printed among other Letters of Bacon's one entitled 'A Letter of Request to Doctor Playfer to translate the book of *Advancement of Learning* into Latin.' There Bacon,

after some explanation of his design in writing the *Advancement*—in which, he says, he had only taken upon him “to ring a bell to call other wits together, which is the meanest office,”—adds, “It cannot but be consonant to my desire to have that bell heard as far as can be And therefore, the privateness of the language considered, wherein it is written, excluding so many readers; as on the other side, the obscurity of the argument, in many parts of it, excludeth many others; I must account it a second birth of that work if it may be translated into Latin, without manifest loss of the sense and matter. For this purpose I could not represent to myself any man into whose hands I do desire more earnestly that work should fall than yourself; for, by that I have heard and read, I know no man a greater master in commanding words to serve matter. Nevertheless I am not ignorant of the worth of your labours; whether such as your place and profession imposeth, or such as your own virtue may, upon your voluntary election, take in hand. But I can lay before you no other persuasions than either the work itself may affect you with, or the honour of his majesty, to whom it is dedicated; or your own particular inclination to myself; who, as I never took so much comfort in any labour of mine own, so I shall never acknowledge myself more obliged in anything to the labour of another than in that which shall assist it; which your labour, if I can by my place, profession, means, friends, travail, work, deed, requite unto you, I shall esteem myself so straitly bound thereunto as I shall be ever most ready to take and seek occasion of thankfulness.” Doctor Thomas Playfer, or Playfere, who was Margaret Professor of Divinity in the University of Cambridge, died in the beginning of the year 1608; so that the letter must have been written before then. Tenison relates, in the Introduction to the *Baconiana* (1679), that the translation was undertaken and actually begun by Playfer. “The Doctor,” he says, “was willing to serve so excellent a person, and so worthy a design; and within a while sent him a specimen of a Latin translation. But men generally come short

of themselves when they strive to outdo themselves. They put a force upon their natural genius, and by straining of it crack and disable it. And so, it seems, it happened to that worthy and elegant man. Upon this great occasion he would be over-accurate; and he sent a specimen of such superfine Latinity, that the Lord Bacon did not encourage him to labour further in that work, in the penning of which he desired not so much neat and polite as clear, masculine, and apt expression." At this time, probably, Bacon contemplated nothing more than a correct translation of the English work, without additions. When he long afterwards determined to extend it so as that it might serve for the First Part of the *Instauratio*, "he caused that part of it," Tenison tells us, "which he had written in English to be translated into the Latin tongue by Mr. Herbert [that is, George Herbert the poet], and some others who were esteemed masters in the Roman eloquence." If we are to understand this in what seems to be the natural and proper sense of the words, it would appear to have been only so much of the *De Augmentis* as had been already published under the title of the *Advancement of Learning* that was rendered into Latin by Herbert and his fellow-labourers; what was added, we are left to suppose, Bacon wrote in Latin, while, in the rest, also, "he so suited the style to his conceptions, by a strict castigation of the whole work," as Tenison adds, "that it may deservedly seem his own." We may add what Bacon has himself said in his letter to Bishop Andrews, prefixed to his 'Advertisement touching an Holy War,' and written in 1623: "For that my book of *Advancement of Learning* may be some preparative or key for the better opening of the *Instauratio*; because it exhibits a mixture of new conceits and old, whereas the *Instauratio* gives the new unmixed, otherwise than with some little aspersion of the old for taste's sake; I have thought good to procure a translation of that book into the general language, not without great and ample additions and enrichment thereof, especially in the Second Book, which handles the Partition of Sciences; in such

sort as I hold it may serve in lieu of the First Part of the *Instauration*, and acquit my promise in that part."

A few additional facts proper to be mentioned here may be gleaned from various letters of Bacon's, in which mention is made of the *Advancement of Learning* or of the *De Augmentis*. In a letter to his friend, Sir Toby Matthew, sent with a copy of the former on its first publication in 1605, we find him writing:—"I have now at last taught that child to go, at the swaddling whereof you were. My work touching the Proficiency and Advancement of Learning, I have put into two Books; whereof the former, which you saw, I can't but account as a page to the latter. I have now published them both: whereof I thought it a small adventure to send you a copy, who have more right to it than any man, except Bishop Andrews, who was my inquisitor." From this it would appear that the First Book of the *Advancement* had been completed probably some years before the second was added. In the letter accompanying the copy of the *De Augmentis* sent to the King Bacon writes:—"This book was the first thing that ever I presented to your majesty; and, it may be, will be the last. For I had thought it should have been *posthuma proles*. But God hath otherwise disposed for a while. It is a translation, but almost enlarged to a new work. I had good helps for the language. I have been also mine own *index expurgatorius*, that it may be read in all places. For, since my end of putting it into Latin was to have it read everywhere, it had been an absurd contradiction to free it in the language, and to pen it up in the matter." To the Prince he writes;—"I send your highness, in all humbleness, my book of *Advancement of Learning*, translated into Latin, but so enlarged as it may go for a new work. It is a book, I think, will live, and be a citizen of the world as English books are not."

The *De Augmentis* was not reprinted in the lifetime of the author; and the first edition is now an extremely rare book. The copy which Bacon presented to King James is still preserved in the British Museum. The subsequent editions Tenison complains of as having been

less correct. The work was early translated into French, through the means of the Marquis Fiat, ambassador from the King of France at the English court; but in this translation "there are," according to Tenison, "many things wholly omitted, many things perfectly mistaken, and some things (especially such as relate to religion) wilfully perverted." There is also a modern French translation, filling the first three volumes of the '*Oeuvres de François Bacon, traduites par Lasalle, avec des notes Critiques, Historiques, et Littéraires,*' 6 tomes, 8vo.; à Dijon, 1800. It has been reprinted, but without the notes, in a volume of the '*Panthéon Littéraire,*' entitled '*Oeuvres Philosophiques, Morales, et Politiques, de François Bacon; avec une notice biographique par J. A. C. Buchon,*' 8vo.; Paris, 1836. There are two English translations. One, by Gilbert Wats, was printed in folio at Oxford in 1640, and again at London in 1674. The other makes part of '*The Philosophical Works of Francis Bacon, by Peter Shaw, M.D.,*' first printed at London in 3 vols. 4to., in 1733; again, in the same form, in 1737; and a third time in 12 vols. 8vo., in 1807.

Mr. Hallam has stated, in his '*Introduction to the History of the Literature of Europe,*' that more than two-thirds of the *De Augmentis* are a version, with slight interpolation or omission, from the *Advancement of Learning*, and that consequently less than one third of the former treatise consists of new matter. This is, we apprehend, an under statement of the extent of the additions. The First Book of the *De Augmentis* is nearly a translation of the *Advancement*; something is omitted, but hardly any thing added. The Second Book of the *Advancement*, however, which is nearly three times as long as the first, is more than doubled in the remaining eight Books of the *De Augmentis*. The new matter, therefore, instead of making less than a third, makes more than three-sevenths, or not much less than half of the whole work; while it makes more than the half of that portion of the work to which the additions are chiefly confined.

The *Advancement of Learning* sets out with the

following panegyric address to King James, which is retained, with very slight abridgment, in the *De Augmentis* :—

There were, under the law, excellent king, both daily sacrifices, and freewill offerings; the one proceeding upon ordinary observance, the other upon a devout cheerfulness: in like manner there belongeth to kings from their servants both tribute of duty and presents of affection. In the former of these I hope I shall not live to be wanting, according to my most humble duty, and the good pleasure of your majesty's employments: for the latter, I thought it more respective to make choice of some oblation, which might rather refer to the proprietary and excellence of your individual person, than to the business of your crown and state.

Wherefore, representing your majesty many times unto my mind, and beholding you not with the inquisitive eye of presumption, to discover that which the Scripture telleth me is inscrutable, but with the observant eye of duty and admiration; leaving aside the other parts of your virtue and fortune, I have been touched, yea, and possessed with an extreme wonder at those your virtues and faculties, which the philosophers call intellectual; the largeness of your capacity, the faithfulness of your memory, the swiftness of your apprehension, the penetration of your judgment, and the facility and order of your elocution: and I have often thought, that of all the persons living that I have known, your majesty were the best instance to make a man of Plato's opinion, that all knowledge is but remembrance, and that the mind of man by nature knoweth all things, and hath but her own native and original notions (which by the strangeness and darkness of this tabernacle of the body are sequestered) again revived and restored: such a light of nature I have observed in your majesty, and such a readiness to take flame and blaze from the least occasion presented, or the least spark of another's knowledge delivered. And as the Scripture saith of the wisest king, "That his heart was as the sands of the sea;" which though it be one of the largest bodies, yet it consisteth of the smallest and finest portions; so hath God given your majesty a composition of understanding admirable, being able to compass and comprehend the greatest matters, and nevertheless to touch and apprehend the least; whereas it should seem an impossibility in nature, for the same instrument to make itself fit for great and small works. And for your gift of speech, I call to mind what Cornelius Tacitus saith of Au-

gustus Cæsar : "Augusto profluens, et quæ principem deceret, eloquentia fuit."* For, if we note it well, speech that is uttered with labour and difficulty, or speech that savoureth of the affectation of art and precepts, or speech that is framed after the imitation of some pattern of eloquence, though never so excellent, all this has somewhat servile, and holding of the subject. But your majesty's manner of speech is indeed princelike, flowing as from a fountain, and yet streaming and branching itself into nature's order, full of facility and felicity, imitating none, and inimitable by any. And as in your civil estate there appeareth to be an emulation and contention of your majesty's virtue with your fortune; a virtuous disposition with a fortunate regiment; a virtuous expectation, when time was, of your greater fortune, with a prosperous possession thereof in the due time; a virtuous observation of the laws of marriage, with most blessed and happy fruit of marriage; a virtuous and most Christian desire of peace, with a fortunate inclination in your neighbour princes thereunto: so likewise, in these intellectual matters, there seemeth to be no less contention between the excellency of your majesty's gifts of nature, and the universality and perfection of your learning. For I am well assured that this which I shall say is no amplification at all, but a positive and measured truth; which is that there hath not been since Christ's time any king or temporal monarch, which has been so learned in all literature and erudition, divine and human. For let a man seriously and diligently revolve and peruse the succession of the emperors of Rome; of which Cæsar the dictator, who lived some years before Christ, and Marcus Antonius, were the best learned; and so descend to the emperors of Græcia, or of the West; and then to the lines of France, Spain, England, Scotland, and the rest, and he shall find this judgment is truly made. For it seemeth much in a king, if by the compendious extractions of other men's wits and labours, he can take hold of any superficial ornaments and shows of learning; or if he countenance and prefer learning and learned men: but to drink indeed of the true fountains of learning, nay, to have such a fountain of learning in himself, in a king, and in a king born, is almost a miracle. And the more, be-

* Augustus had a fluent delivery, such as becomes a prince. (The translations at the foot of the page of Latin passages and phrases in the *Advancement of Learning* are for the most part the same with those of Dr. W. C. Taylor's edition of that work, 8vo., Lond., 1840.)

cause there is met in your majesty a rare conjunction, as well of divine and sacred literature, as of profane and human; so as your majesty standeth invested of that triplicity, which in great veneration was ascribed to the ancient Hermes; the power and fortune of a king, the knowledge and illumination of a priest, and the learning and universality of a philosopher. This propriety, inherent and individual attribute in your majesty, deserveth to be expressed not only in the fame and admiration of the present time nor in the history or tradition of the ages succeeding, but also in some solid work, fixed memorial, and immortal monument, bearing a character or signature both of the power of a king, and the difference and perfection of such a king.

Therefore I did conclude with myself, that I could not make unto your majesty a better oblation than of some treatise tending to that end, whereof the sum will consist of these two parts; the former, concerning the excellency of learning and knowledge, and the excellency of the merit and true glory in the augmentation and propagation thereof: the latter, what the particular acts and works are, which have been embraced and undertaken for the advancement of learning; and again, what defects and undervalues I find in such particular acts: to the end, that though I cannot positively or affirmatively advise your majesty or propound unto you framed particulars; yet I may excite your princely cogitations to visit the excellent treasure of your own mind, and thence to extract particulars for this purpose, agreeable to your magnanimity and wisdom.

First, in vindicating the excellence of learning, "to clear the way, and, as it were, to make silence," in order that the true testimonies concerning its dignity may be the better heard, "without the interruption of tacit objections," the author thinks "good to deliver it from the discredit and disgraces which it hath received, all from ignorance, but ignorance severally disguised; appearing sometimes in the zeal and jealousy of divines, sometimes in the severity and arrogancy of politicians, and sometimes in the errors and imperfections of learned men themselves." Bacon is never more ingenious or more eloquent than in handling a theological topic; and we will quote, as a specimen of the present argument, his answer to the objections of the divines, who, he observes, are wont to say that the aspiring to know-

ledge was the original temptation and cause of the fall; and, among other disparagements, that many learned men have been arch-heretics; that learned times have been inclined to atheism; and that the contemplation of second causes, which is philosophy, withdraws the mind from dependence upon God, the first cause, which is religion. Partly from his early reading and the natural bent of his genius, partly in accommodation to the spirit of his age, which required that every subject should be viewed with some reference to theology, Bacon has introduced his theological notions into almost all his writings. He is fond, also, of repeating his new and peculiar thoughts of all kinds, and several of those which repeatedly occur elsewhere figure in the following passage:—

To discover then the ignorance and error of this opinion, and the misunderstanding in the grounds thereof, it may well appear these men do not observe or consider, that it was not the pure knowledge of nature and universality, a knowledge by the light whereof man did give names unto other creatures in Paradise, as they were brought before him, according unto their proprieties, which gave the occasion to the fall; but it was the proud knowledge of good and evil, with an intent in man to give law unto himself, and to depend no more upon God's commandments, which was the form of the temptation. Neither is it any quantity of knowledge, how great soever, that can make the mind of man to swell; for nothing can fill, much less extend the soul of man, but God and the contemplation of God; and therefore Solomon, speaking of the two principal senses of inquisition, the eye and the ear, affirmeth that the eye is never satisfied with seeing nor the ear with hearing; and if there be no fulness, then is "the continent greater than the content:"* so of knowledge itself, and the mind of man, whereto the senses are but reporters, he defineth likewise in these words, placed after that calendar or ephemerides, which he maketh of the diversities of times and seasons for all actions and purposes; and concludeth thus: "God hath made all things beautiful, or decent, in the true return of their seasons: also he hath placed the world in man's heart, yet cannot man find out the work which God worketh from the beginning to the end:" declaring,

* The thing containing greater than the thing contained.

not obscurely, that God hath framed the mind of man as a mirror or glass, capable of the image of the universal world, and joyful to receive the impression thereof, as the eye joyeth to receive light; and not only delighted in beholding the variety of things and vicissitude of times, but raised also to find out and discern the ordinances and decrees, which throughout all those changes are infallibly observed. And although he doth insinuate that the supreme or summary law of nature, which he calleth "The work which God worketh from the beginning to the end, is not possible to be found out by man;" yet that doth not derogate from the capacity of the mind, but may be referred to the impediments, as of shortness of life, ill conjunction of labours, ill tradition of knowledge over from hand to hand, and many other inconveniences, whereunto the condition of man is subject. For that nothing parcel of the world is denied to man's inquiry and invention, he doth in another place rule over, when he saith, "The spirit of man is as the lamp of God, wherewith he searcheth the inwardness of all secrets." If then such be the capacity and receipt of the mind of man, it is manifest that there is no danger at all in the proportion or quantity of knowledge, how large soever, lest it should make it swell or out-compass itself; no, but it is merely the quality of knowledge, which, be it in quantity more or less, if it be taken without the true corrective thereof, hath in it some nature of venom or malignity, and some effects of that venom, which is ventosity or swelling. This corrective spice, the mixture whereof maketh knowledge so sovereign, is charity, which the apostle immediately addeth to the former clause: for so he saith, "Knowledge bloweth up, but charity buildeth up;" not unlike unto that which he delivereth in another place: "If I spake," saith he, "with the tongues of men and angels, and had not charity, it were but as a tinkling cymbal;" not but that it is an excellent thing to speak with the tongues of men and angels, but because, if it be severed from charity, and not referred to the good of men and mankind, it hath rather a sounding and unworthy glory than a meriting and substantial virtue. And as for that censure of Solomon, concerning the excess of writing and reading books, and the anxiety of spirit which redoundeth from knowledge; and that admonition of St. Paul, "That we be not seduced by vain philosophy;" let those places be rightly understood, and they do indeed excellently set forth the true bounds and limitations, whereby human knowledge is confined and circumscribed; and yet without any such contracting or coarctation, but that it may comprehend all the universal nature

of things. For these limitations are three. The first, that we do not so place our felicity in knowledge as we forget our mortality; the second, that we make application of our knowledge, to give ourselves repose and contentment, and not distaste or repining; the third, that we do not presume by the contemplation of nature to attain to the mysteries of God. For as touching the first of these, Solomon doth excellently expound himself in another place of the same book, where he saith, "I saw well that knowledge recedeth as far from ignorance as light doth from darkness; and that the wise man's eyes keep watch in his head, whereas the fool roundeth about in darkness: but withal I learned, that the same mortality involveth them both." And for the second, certain it is, there is no vexation or anxiety of mind which resulteth from knowledge, otherwise than merely by accident; for all knowledge and wonder (which is the seed of knowledge) is an impression of pleasure in itself; but when men fall to framing conclusions out of their knowledge, applying it to their particular, and ministering to themselves thereby weak fears or vast desires, there groweth that carefulness and trouble of mind which is spoken of; for then knowledge is no more "*Lumen siccum*," whereof Heraclitus the profound said, "*Lumen siccum optima anima*;"* but it becometh "*Lumen madidum, or maceratum*,"† being steeped and infused in the humours of the affections. And as for the third point, it deserveth to be a little stood upon, and not to be lightly passed over: for if any man shall think by view and inquiry into these sensible and material things to attain that light whereby he may reveal unto himself the nature or will of God, then indeed is he spoiled by vain philosophy; for the contemplation of God's creatures and works produceth (having regard to the works and creatures themselves) knowledge, but having regard to God, no perfect knowledge, but wonder, which is a broken knowledge. And therefore it was most aptly said by one of Plato's school, "That the sense of man carrieth a resemblance with the sun, which, as we see, openeth and revealeth all the terrestrial globe; but then again it obscureth and concealeth the stars and celestial globe: so doth the sense discover natural things, but it darkeneth and shutteth up divine." And hence it is true, that it hath proceeded that divers great learned men have been heretical, whilst they have

* Dry light (or intelligence) is the best animating principle.

† Moistened or steeped light.

sought to fly up to the secrets of the Deity by the waxen wings of the senses. And as for the conceit that too much knowledge should incline a man to atheism, and that the ignorance of second causes should make a more devout dependence upon God, who is the first cause; first, it is good to ask the question which Job asked of his friends—"Will you lie for God, as one man will do for another, to gratify him?" For certain it is that God worketh nothing in nature but by second causes; and if they would have it otherwise believed, it is mere imposture, as it were in favour towards God, and nothing else but to offer to the Author of truth the unclean sacrifice of a lie. But farther, it is an assured truth, and a conclusion of experience, that a little or superficial knowledge of philosophy may incline the mind of man to atheism, but a farther proceeding therein doth bring the mind back again to religion: for in the entrance of philosophy, when the second causes, which are next unto the senses, do offer themselves to the mind of man, if it dwell and stay there it may induce some oblivion of the highest cause; but when a man passeth on farther, and seeth the dependence of causes, and the works of Providence, then, according to the allegory of the poets, he will easily believe that the highest link of nature's chain must needs be tied to the foot of Jupiter's chair. To conclude, therefore, let no man, upon a weak conceit of sobriety, or an ill-applied moderation, think or maintain, that a man can search too far, or be too well studied in the book of God's word, or in the book of God's works, divinity, or philosophy; but rather let men endeavour an endless progress or proficience in both; only let men beware that they apply both to charity, and not to swelling—to use, and not to ostentation; and again, that they do not unwisely mingle or confound these learnings together.

We will add a portion of what he says on the head of the discredit that learning has received from learned men themselves:—

Martin Luther, conducted no doubt by a higher Providence, but in discourse of reason, finding what a province he had undertaken against the Bishop of Rome and the degenerate traditions of the church, and finding his own solitude, being no ways aided by the opinions of his own time, was enforced to awake all antiquity, and to call former times to his succour, to make a party against the present time. So that the ancient authors, both in divinity and in humanity, which had long time slept in libraries, began generally to be read and revolved.

This by consequence did draw on a necessity of a more exquisite travail in the languages original, wherein those authors did write, for the better understanding of those authors, and the better advantage of pressing and applying their words. And thereof grew again a delight in their manner of style and phrase, and an admiration of that kind of writing; which was much furthered and precipitated by the enmity and opposition that the propounders of those primitive, but seeming new opinions, had against the schoolmen; who were generally of the contrary part, and whose writings are altogether in a different style and form; taking liberty to coin and frame new terms of art to express their own sense, and to avoid circuit of speech, without regard to the pureness, pleasantness, and, as I may call it, lawfulness of the phrase or word. And again, because the great labour that then was with the people (of whom the Pharisees were wont to say, "*Execrabilis ista turba, quæ non novit legem*"*), for the winning and persuading of them, there grew of necessity in chief price and request eloquence and variety of discourse, as the fittest and forciblest access into the capacity of the vulgar sort; so that these four causes concurring, the admiration of ancient authors, the hate of the schoolmen, the exact study of languages, and the efficacy of preaching, did bring in an affectionate study of eloquence and *copia*† of speech, which then began to flourish. This grew speedily to an excess; for men began to hunt more after words than matter, and more after the choiceness of the phrase, and the round and clean composition of the sentence, and the sweet falling of the clauses, and the varying and illustration of their works with tropes and figures, than after the weight of matter, worth of subject, soundness of argument, life of invention, or depth of judgment. Then grew the flowing and watery vein of Osorius, the Portugal bishop, to be in price. Then did Sturmius spend such infinite and curious pains upon Cicero the orator, and Hermogenes the rhetorician, besides his own books of periods, and imitation, and the like. Then did Car of Cambridge, and Ascham, with their lectures and writings, almost deify Cicero and Demosthenes, and allure all young men that were studious, unto that delicate and polished kind of learning. Then did Erasmus take occasion to make the scoffing echo—"Decem annos consumpsi in legendo Cice-

* The vulgar crowd, which knows not the law, is accursed.

† Fluency.

rone;”* and the echo answered in Greek, “*Ove*, “*Asine*.”† Then grew the learning of the schoolmen to be utterly despised as barbarous. In sum, the whole inclination and bent of those times was rather towards *copia* than weight.

Here, therefore, is the first distemper of learning, when men study words and not matter; whereof though I have represented an example of late times, yet it hath been, and will be, “*secundum majus et minus*” in all time. And how is it possible but this should have an operation to discredit learning, even with vulgar capacities, when they see learned men’s works like the first letter of a patent or limned book, which, though it hath large flourishes, yet it is but a letter? It seems to me that Pygmalion’s frenzy is a good emblem or portraiture of this vanity; for words are but the images of matter, and except they have life of reason and invention, to fall in love with them is all one as to fall in love with a picture.

But yet, notwithstanding, it is a thing not hastily to be condemned, to clothe and adorn the obscurity, even of philosophy itself, with sensible and plausible elocution; for hereof we have great examples in Xenophon, Cicero, Seneca, Plutarch, and of Plato also in some degree; and hereof likewise there is great use. For surely, to the severe inquisition of truth, and the deep progress into philosophy, it is some hindrance; because it is too early satisfactory to the mind of man, and quencheth the desire of further search, before we come to a just period: but then if a man be to have any use of such knowledge in civil occasions, of conference, counsel, persuasion, discourse, or the like, then shall he find it prepared to his hands in those authors which write in that manner. But the excess of this is so justly contemptible, that as Hercules, when he saw the image of Adonis, Venus’ minion, in a temple, said, in disdain, “*Nil sacri es*;”‡ so there is none of Hercules’ followers in learning, that is, the more severe and laborious sort of inquirers into truth, but will despise those delicacies and affectations, as indeed capable of no divineness. And thus much of the first disease or distemper of learning.

The second, which followeth, is in nature worse than the former: for as substance of matter is better than beauty of words, so, contrariwise, vain matter is worse than vain words; wherein it seemeth the reprehension of St. Paul was not only proper for those times, but prophetic for the times following;

* I have spent ten years in reading Cicero.

† Donkey.

‡ You possess no sanctity.

and not only respective to divinity, but extensive to all knowledge : " *Devita profanas vocum novitates, et oppositiones falsi nominis scientiæ.*"* For he assigneth two marks and badges of suspected and falsified science ; the one, the novelty and strangeness of terms—the other, the strictness of positions, which of necessity doth induce oppositions, and questions, and altercations. Surely, like as so many substances in nature, which are solid, do putrify and corrupt into worms, so it is the propriety of good and sound knowledge to putrify and to dissolve into a number of subtle, idle, unwholesome, and, as I may term them, vermiculate questions, which have indeed a kind of quickness, and life of spirit, but no soundness of matter or goodness of quality. This kind of degenerate learning did chiefly reign amongst the schoolmen, who, having sharp and strong wits, and abundance of leisure, and small variety of reading (but their wits being shut up in the cells of a few authors, chiefly Aristotle their dictator, as their persons were shut up in the cells of monasteries and colleges), and knowing little history, either of nature or time, did, out of no great quantity of matter, and infinite agitation of wit, spin out unto us those laborious webs of learning which are extant in their books. For the wit and mind of man, if it work upon matter, which is the contemplation of the creatures of God, worketh according to the stuff, and is limited thereby ; but if it work upon itself, as the spider worketh his web, then it is endless, and brings forth indeed cobwebs of learning, admirable for the fineness of thread and work, but of no substance or profit.

The following short paragraph, with which he concludes his observations on this branch of the subject, is interesting, as showing that Bacon, with all his contempt for the logic of the schoolmen, was not insensible to their merits in various respects. Part of the passage is somewhat abridged in the Latin :

Notwithstanding, certain it is that if those schoolmen, to their great thirst of truth and unwearied travail of wit, had joined variety and universality of reading and contemplation, they had proved excellent lights, to the great advancement of all learning and knowledge; but as they are, they are great

* Avoid profane and science, falsely so called.

vain babblings, and oppositions of

undertakers indeed, and fierce with dark keeping: but as in the inquiry of the divine truth, their pride inclined to leave the oracle of God's word, and to vanish in the mixture of their own inventions; so in the inquisition of nature, they ever left the oracle of God's works, and adored the deceiving and deformed images, which the unequal mirror of their own minds, or a few received authors or principles, did represent unto them. And thus much for the second disease of learning.

For the third vice or disease of learning, which concerneth deceit or untruth, it is of all the rest the foulest, as that which doth destroy the essential form of knowledge, which is nothing but a representation of truth; for the truth of being and the truth of knowing are one, differing no more than the direct beam and the beam reflected. This vice therefore brancheth itself into two sorts—delight in deceiving, and aptness to be deceived; imposture and credulity, which, although they appear to be of a diverse nature, the one seeming to proceed of cunning and the other of simplicity, yet certainly they do for the most part concur; for, as the verse noteth,

*Percontatorem fugito, nam garrulus idem est,**

an inquisitive man is a prattler, so, upon the like reason, a credulous man is a deceiver: as we see it in fame, that he that will easily believe rumours, will as easily augment rumours, and add somewhat to them of his own; which Tacitus wisely noteth, when he saith, "*Fingunt simul creduntque*:"† so great an affinity hath fiction and belief.

He then proceeds:—

And as for the facility of credit which is yielded to arts and opinions, it is likewise of two kinds; either when too much belief is attributed to the arts themselves, or to certain authors in any art. The sciences themselves, which have had better intelligence and confederacy with the imagination of man than with his reason, are three in number; astrology, natural magic, and alchemy; of which sciences, nevertheless, the ends or pretences are noble. For astrology pretendeth to discover that correspondence or concatenation, which is between the superior globe and the inferior: natural magic pretendeth to call and

* Avoid an inquisitive man, for he is also a tell-tale.

† They invent and believe at the same time.

reduce natural philosophy from variety of speculations to the magnitude of works: and alchemy pretendeth to make separation of all the unlike parts of bodies, which in mixtures of nature are incorporate. But the derivations and prosecutions to these ends, both in the theories and in the practices, are full of error and vanity; which the great professors themselves have sought to veil over and conceal by enigmatical writings, and referring themselves to auricular traditions and such other devices, to save the credit of impostors. And yet surely to alchemy this right is due, that it may be compared to the husbandman whereof *Æsop* makes the fable; that, when he died, told his sons, that he had left unto them gold buried under ground in his vineyard; and they digged over all the ground, and gold they found none; but by reason of their stirring and digging the mould about the roots of their vines, they had a great vintage the year following: so assuredly the search and stir to make gold hath brought to light a great number of good and fruitful inventions and experiments, as well for the disclosing of nature, as for the use of man's life.

And as for the overmuch credit that hath been given unto authors in sciences, in making them dictators, that their words should stand, and not counsels, to give advice; the damage is infinite that sciences have received thereby, as the principal cause that hath kept them low, at a stay without growth or advancement. For hence it hath come, that in arts mechanical the first deviser comes shortest, and time addeth and perfecteth: but in sciences the first author goeth farthest, and time loseth and corrupteth. So, we see, artillery, sailing, printing, and the like, were grossly managed at the first, and by time accommodated and refined: but, contrariwise, the philosophies and sciences of Aristotle, Plato, Democritus, Hippocrates, Euclides, Archimedes, of most vigour at the first and by time degenerate and embased; whereof the reason is no other, but that in the former many wits and industries have contributed in one, and in the latter many wits and industries have been spent about the wit of some one, whom many times they have rather depraved than illustrated. For as water will not ascend higher than the level of the first spring-head from whence it descendeth, so knowledge derived from Aristotle, and exempted from liberty of examination, will not rise again higher than the knowledge of Aristotle. And therefore although the position be good, "*Oportet discentem credere,*"* yet it must be

* A learner should believe.

coupled with this, "*Oportet edoctum judicare*;"* for disciples do owe unto masters only a temporary belief, and a suspension of their own judgment till they be fully instructed, and not an absolute resignation, or perpetual captivity: and therefore, to conclude this point, I will say no more, but so let great authors have their due, as time, which is the author of authors, be not deprived of his due, which is, further and further to discover truth.

Besides these three diseases, however, he remarks, "there are some other rather peccant humours than formed diseases," which are not altogether to be passed over:—

The first of these is the extreme affecting of two extremities; the one antiquity, the other novelty; wherein it seemeth the children of time do take after the nature and malice of the father. For as he devoureth his children, so one of them seeketh to devour and suppress the other; while antiquity envieth there should be new additions, and novelty cannot be content to add, but it must deface: surely, the advice of the prophet is the true direction in this matter, "*State super vias antiquas, et videte quænam sit via recta et bona, et ambulate in ea.*"† Antiquity deserveth that reverence, that men should make a stand thereupon, and discover what is the best way; but when the discovery is well taken, then to make progression. And to speak truly, "*Antiquitas sæculi juvenus mundi.*"‡ These times are the ancient times, when the world is ancient, and not those, which we account ancient "*ordine retrogrado,*"§ by a computation backward from ourselves.

This paragraph is noticeable as containing, we believe, the earliest announcement by Bacon of a thought which is, perhaps, of all the striking things that he has said, the one that most readily occurs to recollection in connexion with his name. He has himself repeated the idea of antiquity being the youth, and modern times comparatively the manhood, of the world, in other parts

* The educated man should judge for himself.

† Stand fast in the old ways, and see what is righteous and good, and walk therein.

‡ Antiquity of time is the childhood of the world.

§ In a retrograde order.

of his writings (as he is in the habit of doing with all his remarkable thoughts); it will be found, in particular, eloquently expanded in the First Book of the *Novum Organum*; but it is perhaps principally indebted for its celebrity to its strong accordance with the whole spirit of the Baconian philosophy. Nevertheless, from the manner in which it is here introduced as a Latin phrase, there would seem to be some reason for doubting whether it be an original thought of Bacon's. It has much the appearance of some aphorism or adage of the schools.*

Some of the other errors that infest learning are thus noticed :—

Another error, of a diverse nature from all the former, is the over early and peremptory reduction of knowledge into arts and methods; from which time commonly sciences receive small or no augmentation. But as young men, when they knit and shape perfectly, do seldom grow to a further stature; so knowledge, while it is in aphorisms and observations, it is in growth: but when it once is comprehended in exact methods, it may perchance be further polished and illustrated, and accommo-

* A friend, however, who, if we were to name him, would be recognised as one of the first of living authorities on all points connected with the history of learning and philosophy, informs us that he feels certain of having never met with the expression or the thought in any writer previous to Bacon, although the view of modern times as the advanced age of the world is familiar enough. It may be added, that Bacon's remark appears to have been received as new by his friend Sir Henry Wotton; who, in a letter thanking him for the *Novum Organum*, after having read the First Book and a few aphorisms of the Second, says, "I have learned thus much by it already: that we are extremely mistaken in the computation of antiquity by searching it backwards, because, indeed, the first times were the youngest, especially in points of natural discovery and experience." It takes somewhat, however, from Sir Henry's authority, that he should not have been aware of the promulgation of the thought by Bacon fourteen years before in the *Advancement of Learning*.

dated for use and practice; but it increaseth no more in bulk and substance.

Another error is an impatience of doubt, and haste to assertion without due and mature suspension of judgment. For the two ways of contemplation are not unlike the two ways of action, commonly spoken of by the ancients; the one plain and smooth in the beginning, and in the end impassable; the other rough and troublesome in the entrance, but after a while fair and even: so it is in contemplation; if a man will begin with certainties, he shall end in doubts; but if he will be content to begin with doubts, he shall end in certainties.

But the greatest error of all the rest is the mistaking or misplacing of the last or furthest end of knowledge: for men have entered into a desire of learning and knowledge, sometimes upon a natural curiosity, and inquisitive appetite; sometimes to entertain their minds with variety and delight; sometimes for ornament and reputation; and sometimes to enable them to victory of wit and contradiction; and most times for lucre and profession; and seldom sincerely to give a true account of their gift of reason, to the benefit and use of men: as if there were sought in knowledge a couch, whereupon to rest a searching and restless spirit; or a terrace for a wandering and variable mind to walk up and down with a fair prospect; or a tower of state, for a proud mind to raise itself upon; or a fort or commanding ground, for strife and contention; or a shop for profit or sale; and not a rich storehouse, for the glory of the Creator, and the relief of man's estate. But this is that which will indeed dignify and exalt knowledge, if contemplation and action may be more nearly and straightly conjoined and united together than they have been; a conjunction like unto that of the two highest planets, Saturn, the planet of rest and contemplation, and Jupiter, the planet of civil society and action: howbeit I do not mean, when I speak of use and action, that end before mentioned of the applying of knowledge to lucre and profession; for I am not ignorant how much that diverteth and interrupteth the prosecution and advancement of knowledge, like unto the golden ball thrown before Atalanta, which while she goeth aside and stoopeth to take up, the race is hindered;

*Declinat cursus, aurumque volubile tollit.**

* Turns from the course to grasp the rolling gold.

Neither is my meaning, as was spoken of Socrates, to call philosophy down from heaven to converse upon the earth; that is to leave natural philosophy aside, and to apply knowledge only to manners and policy. But as both heaven and earth do conspire and contribute to the use and benefit of man; so the end ought to be, from both philosophies to separate and reject vain speculations, and whatsoever is empty and void, and to preserve and augment whatsoever is solid and fruitful: that knowledge may not be, as a courtesan, for pleasure and vanity only, or as a bondwoman to acquire and gain to her master's use; but as a spouse, for generation, fruit, and comfort.

The abuses sometimes accompanying the love of knowledge having been thus freely censured, and objections thereby obviated, the author now proceeds to the second thing that he had proposed to accomplish in this First Book, the exposition of the dignity and worth of learning. After having adduced what he calls the divine testimony and evidence, or that which is to be discovered in the Scriptures and the works of God, he turns to human proofs. Here he is led into a digression on the benefits that follow to mankind, "when kings themselves, or persons of authority under them, or other governors in commonwealths and popular estates, are endued with learning:"—

Which felicity of times under learned princes (to keep still the law of brevity, by using the most eminent and selected examples), doth best appear in the age which passed from the death of Domitian the emperor until the reign of Commodus: comprehending a succession of six princes, all learned, or singular favourers and advancers of learning; which age for temporal respects, was the most happy and flourishing that ever the Roman empire (which then was a model of the world) enjoyed: a matter revealed and prefigured unto Domitian in a dream the night before he was slain; for he thought there was grown behind upon his shoulders a neck and a head of gold: which came accordingly to pass in those golden times which succeeded: of which princes we will make some commemoration; wherein although the matter will be vulgar, and may be thought fitter for a declamation than agreeable to a treatise infolded as this is, yet because it is pertinent to the point in

hand, "neque semper arcum tendit Apollo,"* and to name them only were too naked and cursory, I will not omit it altogether.

The first was Nerva ; the excellent temper of whose government is by a glance in Cornelius Tacitus touched to the life : "Postquam divus Nerva res olim insociabiles miscuisset, imperium et libertatem."† And in token of his learning, the last act of his short reign, left to memory, was a missive to his adopted son Trajan, proceeding upon some inward discontent at the ingratitude of the times, comprehended in a verse of Homer's :

Telis, Phœbe, tuis lacrymas ulciscere nostras.‡

Trajan, who succeeded, was for his person not learned : but if we will hearken to the speech of our Saviour, that saith, "He that receiveth a prophet in the name of a prophet, shall have a prophet's reward," he deserveth to be placed amongst the most learned princes : for there was not a greater admirer of learning, or benefactor of learning ; a founder of famous libraries, a perpetual advancer of learned men to office, and a familiar converser with learned professors and preceptors, who were noted to have then most credit in court. On the other side, how much Trajan's virtue and government was admired and renowned, surely no testimony of grave and faithful history doth more livelily set forth, than that legend tale of Gregorius Magnus, bishop of Rome, who was noted for the extreme envy he bore towards all heathen excellency : and yet he is reported, out of the love and estimation of Trajan's moral virtues, to have made unto God passionate and fervent prayers for the delivery of his soul out of hell : and to have obtained it, with a caveat that he should make no more such petitions. In this prince's time also, the persecutions against the Christians received intermission, upon the certificate of Plinius Secundus, a man of excellent learning and by Trajan advanced.

Adrian, his successor, was the most curious man that lived, and the most universal inquirer ; insomuch as it was noted for an error in his mind, that he desired to comprehend all

* Nor does Apollo always bend the bow.

† When the divine Nerva united things formerly irreconcilable,—power and liberty.

‡ O Phœbus, with thy darts avenge our tears.

things, and not to reserve himself for the worthiest things: falling into the like humour that was long before noted in Philip of Macedon; who, when he would needs over-rule and put down an excellent musician in an argument touching music, was well answered by him again, "God forbid, Sir," said he, "that your fortune should be so bad, as to know these things better than I." It pleased God likewise to use the curiosity of this emperor as an inducement to the peace of his church in those days. For having Christ in veneration, not as a God or Saviour, but as a wonder or novelty; and having his picture in his gallery, matched with Apollonius, with whom, in his vain imagination, he thought he had some conformity; yet it served the turn to allay the bitter hatred of those times against the Christian name, so as the church had peace during his time. And for his government civil, although he did not attain to that of Trajan's in glory of arms, or perfection of justice, yet in deserving of the weal of the subject he did exceed him. For Trajan erected many famous monuments and buildings; insomuch as Constantine the Great in emulation was wout to call him "*Parietaria*" (wall flower), because his name was upon so many walls: but his buildings and works were more of glory and triumph than use and necessity. But Adrian spent his whole reign, which was peaceable, in a perambulation or survey of the Roman empire; giving order, and making assignation where he went, for re-edifying of cities, towns, and forts decayed; and for cutting of rivers and streams, and for making bridges and passages, and for policying of cities and commonalties with new ordinances and constitutions, and granting new franchises and incorporations, so that his whole time was a very restoration of all the lapses and decays of former times.

Antoninus Pius, who succeeded him, was a prince excellently learned; and had the patient and subtle wit of a schoolman; insomuch as in common speech, which leaves no virtue untaxed, he was called "*cymini sector*," (a carver or divider of cummin,) which is one of the least seeds; such a patience he had and settled spirit, to enter into the least and most exact differences of causes; a fruit no doubt of the exceeding tranquillity and serenity of his mind; which being no ways charged or incumbered, either with fears, remorses, or scruples, but having been noted for a man of the purest goodness, without all fiction or affectation, that hath reigned or lived, made his mind continually present and entire. He likewise approached a degree nearer unto Christianity, and became, as

Agrippa said unto St. Paul, "half a Christian;" holding their religion and law in good opinion, and not only ceasing persecution, but giving way to the advancement of Christians.

There succeeded him the first "*divi fratres*,"* the two adoptive brethren, Lucius Commodus Verus (son to *Ælius Verus*, who delighted much in the softer kind of learning, and was wont to call the poet *Martial* his *Virgil*), and *Marcus Aurelius Antoninus*; whereof the latter, who obscured his colleague and survived him long, was named the philosopher: who as he excelled all the rest in learning, so he excelled them likewise in perfection of all royal virtues: insomuch as *Julianus* the emperor, in his book entitled '*Cæsares*,' being as a *pasquin* or satire to deride all his predecessors, feigned that they were all invited to a banquet of the gods, and *Silenus* the Jester set at the nether end of the table, and bestowed a scoff on every one as they came in; but when *Marcus Philosophus* came in, *Silenus* was gravelled, and out of countenance, not knowing where to carp at him; save at the last he gave a glance at his patience towards his wife. And the virtue of this prince, continued with that of his predecessor, made the name of *Antoninus* so sacred in the world, that though it were extremely dishonoured in *Commodus*, *Caracalla*, and *Helio-gabalus*, who all bore the name, yet when *Alexander Severus* refused the name, because he was a stranger to the family, the senate with one acclamation said, "*Quomodo Augustus, sic et Antoninus*."† In such renown and veneration was the name of these two princes, in those days, that they would have it as a perpetual addition in all the emperor's styles. In this emperor's time also the church for the most part was in peace; so as in this sequence of six princes we do see the blessed effects of learning in sovereignty, painted forth in the greatest table of the world.

But for a tablet, or picture of smaller volume (not presuming to speak of your majesty that liveth), in my judgment the most excellent is that of *Queen Elizabeth*, your immediate predecessor in this part of Britain; a princess that, if *Plutarch* were now alive to write lives by parallels, would trouble him, I think, to find for her a parallel amongst women. This lady was endued with learning in her sex singular and rare even amongst masculine princes; whether we speak of learning,

* The divine brothers.

† Such as *Augustus* was *Antoninus* is.

language, or of science, modern or ancient, divinity or humanity: and unto the very last year of her life she was accustomed to appoint set hours for reading, scarcely any young student in a university more daily, or more dully. As for her government, I assure myself, I shall not exceed if I do affirm that this part of the island never had forty-five years of better times; and yet not through the calmness of the season, but through the wisdom of her regimen. For if there be considered of the one side, the truth of religion established, the constant peace and security, the good administration of justice, the temperate use of the prerogative, nor slackened, nor much strained, the flourishing state of learning, sortable to so excellent a patroness, the convenient estate of wealth and means, both of crown and subject, the habit of obedience, and the moderation of discontents; and there be considered, on the other side, the differences of religion, the troubles of neighbour countries, the ambition of Spain, and opposition of Rome; and then, that she was solitary and of herself: these things, I say, considered, as I could not have chosen an instance, so recent and so proper, so I suppose I could not have chosen one more remarkable or eminent to the purpose now in hand, which is concerning the conjunction of learning in the prince with felicity in the people.

All this is very much abridged in the Latin; the account of the Roman emperors is reduced to about a third of the space which it occupies in the original English, and the panegyric upon Elizabeth is omitted altogether.

We can only afford to give one short paragraph more from the splendid conclusion of this First Book:—

Again, for the pleasure and delight of knowledge and learning, it far surpasseth all other in nature: for, shall the pleasures of the affections so exceed the senses, as much as the obtaining of desire or victory exceedeth a song or a dinner; and must not, of consequence, the pleasures of the intellect or understanding exceed the pleasures of the affections? We see in all other pleasures there is a satiety, and after they be used, their verdure departeth; which sheweth well they be but deceits of pleasure, and not pleasures; and that it was the novelty which pleased, and not the quality: and therefore we see that voluptuous men turn friars, and ambitious princes

turn melancholy. But of knowledge there is no satiety, but satisfaction and appetite are perpetually interchangeable; and therefore appeareth to be good in itself simply, without fallacy or accident. Neither is that pleasure of small efficacy and contentment to the mind of man, which the poet Lucretius describeth elegantly.

Suave mari magno turbantibus sequora ventis, &c.

"It is a view of delight," saith he, "to stand or walk upon the shore side, and to see a ship tossed with tempest upon the sea: or to be in a fortified tower, and to see two battles join upon a plain; but it is a pleasure incomparable, for the mind of man to be settled, landed, and fortified in the certainty of truth; and from thence to descry and behold the errors, perturbations, labours and wanderings up and down of other men."

Lastly, leaving the vulgar arguments, that by learning man excelleth man in that wherein man excelleth beasts; that by learning man ascendeth to the heavens and their motions, where in body he cannot come and the like; let us conclude with the dignity and excellency of knowledge and learning in that whereunto man's nature doth most aspire, which is, immortality or continuance: for to this tendeth generation, and raising of houses and families; to this tend buildings, foundations, and monuments; to this tendeth the desire of memory, fame, and celebration, and in effect the strength of all other human desires. We see then how far the monuments of wit and learning are more durable than the monuments of power or of the hands. For have not the verses of Homer continued twenty-five hundred years, or more, without the loss of a syllable or letter; during which time, infinite palaces, temples, castles, cities, have been decayed, and demolished? It is not possible to have the true pictures or statues of Cyrus, Alexander, Cæsar; no, nor of the kings or great personages of much later years; for the originals cannot last, and the copies cannot but lose of the life and truth. But the images of men's wits and knowledges remain in books, exempted from the wrong of time, and capable of perpetual renovation. Neither are they fitly to be called images, because they generate still, and cast their seeds in the minds of others, provoking and causing infinite actions and opinions in succeeding ages: so that if the invention of the ship was thought so noble, which carrieth riches and commodities from place to place, and consociateth the most remote regions in participation of their fruits, how much more are letters to be magnified,

which, as ships, pass through the vast seas of time, and make ages so distant to participate of the wisdom, illuminations, and inventions, the one of the other !

The new matter introduced in the Second Book of the *De Augmentis* amounts to about the quantity of the old retained. It is divided into thirteen chapters. Among the introductory remarks are the following, which are nearly the same in the Latin as in the English :—

Inasmuch as most of the usages and orders of the universities were derived from more obscure times, it is the more requisite they be re-examined. In this kind I will give an instance or two, for example sake, of things that are the most obvious and familiar. The one is a matter, which though it be ancient and general, yet I hold to be an error ; which is that scholars in universities come too soon and too unripe to logic and rhetoric, arts fitter for graduates than children and novices : for these two, rightly taken, are the gravest of sciences, being the arts of arts ; the one for judgment the other for ornament : and they be the rules and directions how to set forth and dispose matter : and therefore for minds empty and unfraught with matter, and which have not gathered that which Cicero calleth “*sylva*” and “*suppellex*,” stuff and variety, to begin with those arts (as if one should learn to weigh, or to measure, or to paint the wind), doth work but this effect, that the wisdom of those arts, which is great and universal, is almost made contemptible, and is degenerate into childish sophistry and ridiculous affectation. And further the untimely learning of them hath drawn on, by consequence, the superficial and unprofitable teaching and writing of them, as fitteth indeed to the capacity of children. Another is a lack I find in the exercises used in the universities, which do make too great a divorce between invention and memory ; for their speeches are either premeditated, “*in verbis conceptis*,”* where nothing is left to invention, or merely extemporal, where little is left to memory ; whereas in life and action there is least use of either of these, but rather of intermixtures of premeditation and invention, notes and memory ; so as the exercise fitteth nor the practice, nor the image the life ; and it is ever a true rule in exercises, that they be framed as near as may be to the life of practice ; for otherwise

* Set forms of words.

they do pervert the motions and faculties of the mind, and not prepare them. The truth whereof is not obscure, when scholars come to the practices of professions, or other actions of civil life; which when they set into, this want is soon found by themselves, and sooner by others. But this part touching the amendment of the institutions and orders of universities, I will conclude with the clause of Cæsar's letter to Oppius and Balbus, "*Hoc quemadmodum fieri possit, nonnulla mihi in mentem veniunt, et multa reperiri possunt; de iis rebus rogo vos ut cogitationem suscipiatis.*"

The last defect which I will note is, that there hath not been, or very rarely been, any public designation of writers or inquirers concerning such parts of knowledge as may appear not to have been already sufficiently laboured or undertaken; unto which point it is an inducement to enter into a view and examination what parts of learning have been prosecuted, and what omitted: for the opinion of plenty is amongst the causes of want, and a great quantity of books maketh a show rather of superfluity than lack; which surcharge nevertheless is not to be remedied by making no more books, but by making more good books, which, as the serpent of Moses, might devour the serpents of the enchanters.

The author then enters upon the proper subject of the work by laying down what he calls the Partitions of the Sciences, or the General Distribution of Human Knowledge. This is an attempt that has been often made since Bacon first set the example, but hardly perhaps yet with perfect success. The general outline of Bacon's scheme is sufficiently simple. He assigns all human learning either to the Memory, to the Imagination, or to the Reason; the domain of the first being History; that of the second, Poesy; that of the third, Philosophy. The subdivisions are exhibited in a table; and the explanation of their nature, and of the extent to which they have been cultivated, or to which they remain unknown or unreclaimed, is the object of the work. In this Second Book are included both History and Poesy;

* I have thought of some means by which this may be effected, and many others may be devised; I request that you will take the matter into serious consideration.

so that Philosophy alone occupies the remaining Seven Books.

History is divided into Natural and Civil ; the latter, however, comprehending Ecclesiastical and Literary in addition to what is commonly called Civil History. Natural History is of three sorts :—of nature in course, of nature erring or varying, and of nature altered or wrought ; that is, History of Creatures (*Generationum*) ; History of Marvels (*Praeter-generationum*) ; and History of Arts. The first is declared to be moderately well cultivated ; the second and third so slightly and to so little purpose that they may be classed among the desiderata. Natural History, in reference to its utility or application, is afterwards stated to be of two kinds ; according as it supplies the knowledge of facts, or what Bacon calls the primitive matter (*materia prima*) of philosophy. The former he names Narrative ; the latter, Inductive ; and the Inductive he places among the desiderata.

In treating of the three divisions of Civil History, he begins with Literary History, or that of Learning and Arts. This also he declares to be deficient. Then, proceeding to Civil History properly so called, he divides it into three kinds, Memorials, Perfect Histories, and Antiquities ; “not unfitly to be compared with the three kinds of pictures or images. For, of pictures or images, we see some are unfinished, some are perfect, and some are defaced ; so . . . Memorials are History unfinished, or the first or rough draughts of History ; and Antiquities are History defaced, or some remnants of History which have casually escaped the shipwreck of time.” Memorials, or preparations for history, again, are either commentaries or registers. And neither in these nor in Antiquities is any deficiency asserted, beyond what belongs to their nature.

Perfect History, or History Proper, is also divided into three kinds, “according to the object which it propoundeth, or pretendeth to represent ; for it either representeth a time, a person, or an action.” The first our author calls Chronicles ; the second, Lives ; the third,

Narrations or Relations. It is in speaking of the first that he introduces the rapid review of the recent history of England, the first draught of which is found, as we have already had occasion to notice, in a letter written by him to Lord Ellesmere in April, 1605,* a few months before the publication of the *Advancement of Learning*. The passage as it stands in that work is as follows; and it is pretty closely translated in the *De Augmentis*, except that the short eulogy on the government of Elizabeth is omitted:—

But for modern Histories, whereof there are some few very worthy, but the greater part beneath mediocrity (leaving the care of foreign stories to foreign states, because I will not be "curiosus in aliena republica"),† I cannot fail to represent to your majesty the unworthiness of the history of England in the main continuance thereof, and the partiality and obliquity of that of Scotland in the latest and largest author that I have seen: supposing that it would be honour for your majesty, and a work very memorable, if this island of Great Britain, as it is now joined in monarchy for the age to come, so were joined in one history for the times passed; after the manner of the sacred history, which draweth down the story of the ten tribes and of the two tribes, as twins, together. And if it shall seem that the greatness of this work may make it less exactly performed; there is an excellent period of a much smaller compass of time, as to the story of England; that is to say, from the uniting of the roses to the uniting of the kingdoms; a portion of time, wherein to my understanding, there hath been the rarest varieties that in like number of successions of any hereditary monarchy hath been known: for it beginneth with the mixed adoption of a crown by arms and title: an entry by battle, an establishment by marriage, and therefore times answerable, like waters after a tempest, full of working and swelling, though without extremity of storm; but well passed through by the wisdom of the pilot, being one of the most sufficient kings of all the number. Then followeth the reign of a king, whose actions, howsoever conducted, had much intermixture with the affairs of Europe, balancing and inclining them variably; in whose time also began that great alteration

* See vol. i. p. 214.

† Too inquisitive in the affairs of a foreign state.

in the state ecclesiastical, an action which seldom cometh upon the stage. Then the reign of a minor: then an offer of a usurpation, though it was but as "febris ephemera."* Then the reign of a queen matched with a foreigner: then of a queen that lived solitary and unmarried, and yet her government so masculine, that it had greater impression and operation upon the states abroad than it any ways received from thence. And now last, this most happy and glorious event, that this island of Britain, divided from all the world, should be united in itself: and that oracle of rest, given to Æneas, "Antiquam exquirite matrem,"† should now be performed and fulfilled upon the nations of England and Scotland, being now reunited in the ancient mother name of Britain, as a full period of all instability and peregrinations: so that as it cometh to pass in massive bodies, that they have certain trepidations and waverings before they fix and settle; so it seemeth that by the providence of God, this monarchy, before it was to settle in your majesty and your generations, (in which, I hope, it is now established for ever,) had these prelusive changes and varieties.

The department of Lives is described as in modern times lying much waste; and, as for Narrations and Relations of particular actions, "there were also," it is observed, "to be wished a greater diligence therein." Other divisions of History Proper follow, into Universal and Particular, and into Annals and Journals (*Acta Diurna*); then a second division of Civil History into Pure and Mixed (such as Cosmography, which is compounded of Civil and Natural History); then of Ecclesiastical History, into the General History of the Church, the History of Prophecy, and the History of Providence, or the Divine Retribution (*Nemesis*). Lastly, there are the Appendices to History; namely, Orations, Letters, and Apophthegms, or brief sayings.

The remarkable passage which commences the disquisition on Poesy is nearly the same in the *De Augmentis* as in the *Advancement* :—

POESY is a part of learning in measure of words for the most

* A fever of brief duration.

† Seek your ancient mother (the land of your ancestors).

part restrained, but in all other points extremely licensed, and doth truly refer to the imagination; which, being not tied to the laws of matter, may at pleasure join that which nature hath severed, and sever that which nature hath joined; and so make unlawful matches and divorces of things; "*Pictoribus atque poetis*,"* &c. It is taken in two senses in respect of words, or matter; in the first sense it is but a character of style, and belongeth to arts of speech, and is not pertinent for the present: in the latter, it is, as hath been said, one of the principal portions of learning, and is nothing else but feigned history, which may be styled as well in prose as in verse.

The use of this feigned history hath been to give some shadow of satisfaction to the mind of man in those points wherein the nature of things doth deny it, the world being in proportion inferior to the soul: by reason whereof there is agreeable to the spirit of man, a more ample greatness, a more exact goodness, and a more absolute variety, than can be found in the nature of things. Therefore, because the acts or events of true history have not that magnitude which satisfieth the mind of man, poesy feigneth acts and events greater and more heroical: because true history propoundeth the successes and issues of actions not so agreeable to the merits of virtue and vice, therefore poesy feigns them more just in retribution, and more according to revealed providence: because true history representeth actions and events more ordinary, and less interchanged, therefore poesy endueth them with more rareness, and more unexpected and alternative variations: so as it appeareth that, poesy serveth and conferreth to magnanimity, morality and to delectation. And therefore it was ever thought to have some participation of divineness, because it doth raise and erect the mind, by submitting the shows of things to the desires of the mind; whereas reason doth buckle and bow the mind unto the nature of things. And we see, that by these insinuations and congruities with man's nature and pleasure, joined also with the agreement and consort it hath with music, it hath had access and estimation in rude times and barbarous regions, where other learning stood excluded.

Poetry is divided into Narrative or Heroic, Representative or Dramatic, and Allusive or Parabolical. The account of Parabolical Poetry is greatly extended by the introduction from the treatise *De Sapientia Veterum* of

* Painters and poets have equal privilege in fiction.

the explanations of the three fables of Pan, Persons, and Bacchus, all of which we have given in the extracts from that treatise in our first volume.* Considerable additions, however, are here made to each of them. In Poesy our author professes to be able to report no deficiency. "For," he observes, "being as a plant that cometh of the lust of the earth, without a formal seed, it hath sprung up and spread abroad more than any other kind. But, to ascribe unto it that which is due, for the expression of affections, passions, corruptions, and customs we are beholden to poets more than to the philosophers' works; and, for wit and eloquence, not much less than to orators' harangues." "But it is not good," he concludes, "to stay too long in the theatre. Let us now pass on to the judicial place or palace of the mind; which we are to approach and view with more reverence and attention."

The Third Book of the *De Augmentis*, which is divided into six chapters, also contains very nearly as much new matter as old. "All History, excellent King," it begins, to employ the old version of Wats, "treads upon the earth, and performs the office of a guide rather than of a light; and Poesy is, as it were, the dream of Knowledge; a sweet pleasing thing, full of variations, and would be thought to be somewhat inspired with divine rapture; which dreams likewise present. But now it is time for me to awake, and to raise myself from the earth, cutting the liquid air of Philosophy and Sciences." Knowledge, it is then remarked, is like the waters; of which some descend from above, and some spring from beneath. By the knowledge that descends from above Bacon means Theology; by that which springs from beneath, Philosophy. Theology, or Divinity, he leaves for the last place, "as the haven and sabbath of all man's contemplations;" he now proceeds to a survey of Philosophy, which, according as it is occupied with God, Nature, or Man, he

* See vol. i. pp. 97-110.

designates Divine Philosophy, Natural Philosophy, and Human Philosophy or Humanity. "But," he adds, "because the distributions and partitions of knowledge are not like several lines that meet in one angle, and so touch but in a point; but are like branches of trees, that meet in a stem, which hath a dimension and quantity of entireness and continuance before it come to discontinue and break itself into arms and boughs; therefore it is good, before we enter into the former distribution, to erect and constitute one universal science by the name of *Philosophia Prima*, Primitive or Summary Philosophy, as the main and common way before we come where the ways part and divide themselves." His meaning, he afterwards says, touching this Original or Universal Philosophy, is, "in a plain and gross description by negative," this:—"That it be a receptacle for all such profitable observations and axioms as fall not within the compass of any of the special parts of philosophy or sciences, but are more common and of a higher stage." Thus far in the words of the *Advancement of Learning*: what follows is more extended in the *De Augmentis*; and, as the passage is material to the statement of Bacon's philosophical system, we will give it from the version of Dr. Shaw, who, although he has omitted some of the ornament, has preserved its substance:

Axioms of this kind are numerous: for example:—1. If equals are added to unequals, the wholes will be unequal. This is a rule in mathematics, which holds also in ethics, with regard to distributive justice. 2. Things agreeing to the same third, agree also with one another. This likewise is an axiom in mathematics; and at the same time so serviceable in logic, as to be the foundation of syllogism. 3. Nature shows herself best in her smallest works. This is a rule in philosophy that produced the atoms in Democritus; and was justly employed by Aristotle in politics, where he begins the consideration of a commonwealth in a family. 4. All things change, but nothing is lost. This is an axiom in physics, and holds in natural theology; for as the sum of matter neither diminishes nor increases, so it is equally the work of omnipotence to create, or to annihilate it. 5. Things are preserved from destruction by bringing them back to their principles. This is an axiom in

physics, but holds equally in politics; for the preservation of states, as is well observed by Machiavel, depends upon little more than reforming and bringing them back to their ancient customs. 6. A discord ending immediately in a concord sets off the harmony. This is a rule in music, that also holds true in morals. 7. A trembling sound in music gives the same pleasure to the ear, as the coruscation of water, or the sparkling of a diamond to the eye. 8. The organs of the senses resemble the organs of reflection, as we see in optics and acoustics; where a conclave glass resembles the eye, and a sounding cavity the ear. And of these axioms an infinite number might be collected. And thus the celebrated Persian magic was, in effect, no more than a notation of the correspondence in the structure and formation of things natural and civil. Nor let any one understand all this of mere similitudes, as they might at first appear; for they really are one and the same footsteps, and impressions of nature, made upon different matters and subjects. And in this light the thing has not hitherto been carefully treated. A few of these axioms may indeed be found in the writings of eminent men, here and there interspersed occasionally: but a collected body of them, which should have a primitive and summary tendency to the sciences, is not hitherto extant; though a thing of so great moment, as remarkable to shew nature to be one and the same: which is supposed the office of a primary philosophy.

The reader will form his own opinion from all this as to whether Bacon had any very distinct conception of this so-called *Prima Philosophia*. He goes on to state, that there is another part of it, which in so far as respects the terms, indeed, is ancient, but in the thing itself, as he understands it, is new. This is the inquisition concerning the adventitious conditions of entities (which may be called transcendental); such as paucity and multitude, similitude and diversity, the possible and impossible, even entity and nonentity, and the like. It is fit, he says, that this contemplation, as having no little both of dignity and utility, be not altogether deserted, but have at least some place in the partitions of the sciences. But it should be conducted in a manner very different from that which has been commonly followed. "For example," (to adopt Shaw's translation),

No writer who has treated of much and little, endeavours to assign the cause why some things in nature are so numerous and large, and others so rare and small; for, doubtless, it is impossible, in the nature of things, that there should be as great a quantity of gold as of iron, or roses as plenty as grass, &c.; so likewise nobody that treats of like and different has sufficiently explained why, betwixt particular species, there are almost constantly interposed some things that partake of both; as moss betwixt corruption and a plant; notiouless fish betwixt a plant and an animal; bats betwixt birds and quadrupeds, &c. Nor has any one hitherto discovered why iron does not attract iron, as the loadstone does, and why gold does not attract gold, as quicksilver does, &c. But of these particulars we find no mention in the discourses of transcendentals: for men have rather pursued the quirks of words than the subtilities of things. And therefore we would introduce into primary philosophy, a real and solid inquiry into these transcendentals, or adventitious condition of beings, according to the laws of nature, not of speech.

Then follows a chapter on Divine Philosophy, or Natural Theology. After that we come to Natural Philosophy, which is in the first place divided into Speculative and Operative; or, the inquisition of Causes and the production of Effects; or, as they may be otherwise named, Natural Science and Natural Prudence. Speculative Philosophy, again, or Theory, is divided into Physic and Metaphysic. The term Metaphysic, however, Bacon warns us, he uses in a different sense from that commonly received. Then he proceeds, as we have the passage in his own English in the *Advancement* :—

And herein I cannot a little marvel at the philosopher Aristotle, that did proceed in such a spirit of difference and contradiction towards all antiquity, undertaking, not only to frame new words of science at pleasure, but to confound and extinguish all ancient wisdom; insomuch, as he never nameth or mentioneth an ancient author or opinion, but to confute and reprove; wherein for glory, and drawing followers and disciples, he took the right course. For certainly there cometh to pass, and hath place in human truth, that which was noted and pronounced in the highest truth: “Veni in nomine Patris, nec recipitis me; si quis venerit in nomine suo, eum reci-

pietis.”* But in this divine aphorism (considering to whom it was applied, namely, to Antichrist, the highest deceiver) we may discern well that the coming in a man's own name, without regard of antiquity or paternity, is no good sign of truth, although it be joined with the fortune and success of an “Eum recipietis.”† But for this excellent person, Aristotle, I will think of him that he learned that humour of his scholar, with whom, it seemeth, he did emulate; the one to conquer all opinions, as the other to conquer all nations; wherein, nevertheless, it may be, he may at some men's hands, that are of a bitter disposition, get a like title as his scholar did :

Felix terrarum prædo, non utile mundo
Editus exemplum, &c.‡

So,

Felix doctrinæ prædo.§

But to me, on the other side, that do desire as much as lieth in my pen to ground a sociable intercourse between antiquity and proficience, it seemeth best to keep way with antiquity, “usque ad aras;”|| and therefore to retain the ancient terms, though I sometimes alter the uses and definitions according to the moderate proceeding in civil government; where, although there be some alteration, yet that holdeth which Tacitus wisely noteth, “eadem magistratuum vocabula.”¶

To return, therefore, to the use and acceptation of the term metaphysic, as I do now understand the word; it appeareth, by that which hath been already said, that I intend, “philosophia prima,” Summary Philosophy and Metaphysic, which heretofore have been confounded as one, to be two distinct things. For the one I have made as a parent or common ancestor to all knowledge, and the other I have now brought in as a branch or descendant of natural science. It appeareth

* I came in the name of my father, and ye will not receive me: if any one comes in his own name ye will receive him.

† Ye will receive him.

‡ A lucky plunderer of mankind; his name
And vile example now are doomed to shame.

§ A lucky plunderer of learning.

|| To the altars, i. e., to the extreme.

¶ The judicial forms remain the same.

likewise that I have assigned to summary philosophy the common principles and axioms which are promiscuous and indifferent to several sciences: I have assigned unto it likewise the inquiry touching the operation of the relative and adventive characters of essences, as quantity, similitude, diversity, possibility, and the rest, with this distinction and provision, that they be handled as they have efficacy in nature, and not logically. It appeareth likewise that Natural Theology, which heretofore hath been handled confusedly with Metaphysic, I have enclosed and bounded by itself. It is, therefore, now a question what is left remaining for Metaphysic; wherein I may, without prejudice, preserve thus much of the conceit of antiquity, that Physic should contemplate that which is inherent in matter, and therefore transitory; and Metaphysic that which is abstracted and fixed. And, again, that Physic should handle that which supposeth in nature only a being and moving; and Metaphysic should handle that which supposeth further in nature a reason, understanding, and platform. But the difference, perspicuously expressed, is most familiar and sensible. For as we divided natural philosophy in general into the inquiry of causes and productions of effects, so that part which concerneth the inquiry of causes we do subdivide, according to the received and sound division of causes; the one part, which is Physic, inquireth and handleth the material and efficient causes; and the other, which is Metaphysic, handleth the formal and final causes.

Physic, taking it according to the derivation, and not according to our idiom for medicine, is situate in a middle term or distance between natural history and Metaphysic. For natural history describeth the variety of things; Physic, the causes, but variable or respective causes, and Metaphysic, the fixed and constant causes.

*Limus ut hic durescit, et hæc ut cera liquescit,
Uuo eodemque igni :**

Fire is the cause of induration, but respective to clay; fire is the cause of colliquation, but respective to wax; but fire is no constant cause either of induration or colliquation: so then the physical causes are but the efficient and the matter.

* The clay is hardened and the wax dissolved
By the same changeless fire.

Physic is next divided into three doctrines or branches ; according as it relates to the principles of things, to the universe or fabric of things, or to things considered in their multiplicity and variety. This last again is subdivided into two branches ; the physic of Concretes and the Physic of Abstracts. Under the head of Concrete Physic, a long disquisition follows on the subject of astronomy and astrology, which is highly curious in some respects, but makes no part of the Baconian philosophy, and does not admit of abridgment. Astronomy, Bacon describes as having its foundations not ill laid in the phenomena, but as neither raised to any height nor even constructed with any solidity so far as it has been carried ; astrology he considers to be, for the most part, destitute of any foundation whatever. He suggests, however, some rules or precepts for the establishment of what he calls a sound astrology. Abstract Physic is divided into two parts : the doctrine of the Schemes of matter, and the doctrine of Appetites and Motions. The Schemes of matter are enumerated as being density, rarity ; gravity, levity ; heat, cold ; tangibility, pneumatic (or airy) ; volatility, fixity ; determinate, fluid ; humid, dry ; fat, lean ; hard, soft ; fragile, tensile ; porous, united ; spirituous, jejune ; simple, compound ; absolute, imperfectly mixed ; fibrous and venous ; of simple positions or equal ; similar, dissimilar ; specificate, non-specificate ; organic, inorganic ; animate, inanimate. Appetites and motions, again, are either Simple or Compound. Finally, there are two Appendages to Physic ; Natural Problems, and the Placets or opinions of the ancient philosophers ; both referring not so much to the matter as to the manner of inquiry ; the former an appendage to the physic of Nature multiplied or spread out, the latter to that of Nature united. In other words, the Problems comprehend doubts as to particulars ; the Placets, general questions as to the principles and fabric of the universe. Here is the paragraph, as it stands in the *Advancement* (from which it is very slightly altered in the *De Augmentis*) on the Placets, or differing opinions, of the ancient philosophers, Pythagoras, Philolaus, Xenophanes, Anaxa-

goras, Parmenides, Leucippus, Democritus, and others, "touching the principles of nature, and the fundamental points of the same, which have caused the diversity of sects, schools, and philosophers :"—

For, although Aristotle, as though he had been of the race of the Ottomans, thought he could not reign except the first thing he did he killed all his brethren, yet to those that seek truth and not magistrality, it cannot but seem a matter of great profit, to see before them the several opinions touching the foundations of nature; not for any exact truth that can be expected in those theories; for, as the same phænomena in astronomy are satisfied by the received astronomy of the diurnal motion, and the proper motions of the planets, with their eccentrics and epicycles, and likewise by the theory of Copernicus, who supposed the earth to move, (and the calculations are indifferently agreeable to both,) so the ordinary face and view of experience is many times satisfied by several theories and philosophies; whereas to find the real truth requireth another manner of severity and attention. For, as Aristotle saith, that children at the first will call every woman mother, but afterwards they come to distinguish according to truth, so experience, if it be in childhood, will call every philosophy mother, but, when it cometh to ripeness, it will discern the true mother. So, as in the mean time it is good to see the several glosses and opinions upon nature, whereof, it may be, every one in some one point hath seen clearer than his fellows, therefore, I wish some collection to be made, painfully and understandingly, "*de antiquis philosophiis*,"* out of all the possible light which remaineth to us of them: which kind of work I find deficient. But here I must give warning, that it be done distinctly and severally; the philosophies of every one throughout by themselves, and not by titles packed and fagoted up together as hath been done by Plutarch. For it is the harmony of a philosophy in itself which giveth it light and credence; whereas, if it be singled and broken, it will seem more foreign and dissonant. For, as when I read in Tacitus, the actions of Nero, or Claudius, with circumstances of times, inducements, and occasions, I find them not so strange; but when I read them in Suetonius Tranquillus, gathered into titles

* On the ancient systems of philosophy.

and bundles, and not in order of time, they seem more monstrous and incredible: so is it of any philosophy reported entire, and dismembered by articles. Neither do I exclude opinions of latter times to be likewise represented in this calendar of sects of philosophy, as that of Theophrastus Paracelsus, eloquently reduced into a harmony by the pen of Severinus, the Dane; and that of Tilesius, and his scholar Donius, being as a pastoral philosophy, full of sense, but of no great depth; and that of Fracastorius, who, though he pretended not to make any new philosophy, yet did use the absoluteness of his own sense upon the old; and that of Gilbertus our countryman, who revived, with some alterations and demonstrations, the opinions of Xenophanes; and any other worthy to be admitted.

Proceeding now to Metaphysics, to which he has assigned the inquiry into formal and final causes, Bacon begins by combating "the received and inveterate opinion, that the inquisition of man is not competent to find out essential forms, or true differences." It is necessary that we should give in full what he says upon this matter, his views in regard to which colour much both of the language and the substance of his philosophy. The passage, though occupying a different position in the *Advancement*, is nearly the same there as in the *De Augmentis*. After remarking "that the invention of forms is of all other parts of knowledge the worthiest to be sought, if it be possible to be found," he goes on, in his own English, as follows:—

As for the possibility, they are ill discoverers that think there is no land, when they can see nothing but sea. But it is manifest that Plato in his opinion of ideas, as one that had a wit of elevation situate as upon a cliff, did descry, "That forms were the true object of knowledge;" but lost the real fruit of his opinion, by considering of forms as absolutely abstracted from matter, and not confined and determined by matter; and so turning his opinion upon theology, wherewith all his natural philosophy is infected. But if any man shall keep a continual watchful and severe eye upon action, operation, and the use of knowledge, he may advise and take notice what are the forms, the disclosures whereof are fruitful and important to the state of man. For as to the forms of substances,

man only except, of whom it is said, "*Formavit hominem de limo terræ, et spiravit in faciem ejus spiraculum vitæ*,"* and not, as of all other creatures, "*Producant aquæ, producat terra*;"† the forms of substances, I say, as they are now by compounding and transplanting multiplied, are so perplexed, as they are not to be inquired; no more than it were either possible or to purpose to seek in gross the forms of those sounds which make words, which by composition and transposition of letters, are infinite. But, on the other side, to inquire the form of those sounds or voices which make simple letters, is easily comprehensible, and being known, induceth and manifesteth the forms of all words, which consist and are compounded of them. In the same manner to inquire the form of a lion, of an oak, of gold; nay, of water, of air, is a vain pursuit: but to inquire the forms of sense, of voluntary motion, of vegetation, of colours, of gravity and levity, of density, of tenuity, of heat, of cold, and all other natures and qualities, which, like an alphabet, are not many, and of which the essences, upheld by matter, of all creatures do consist; to inquire, I say, the true forms of these, is that part of Metaphysic which we now define of. Not but that physic doth make inquiry, and take consideration of the same natures: but how? Only as to the material and efficient causes of them, and not as to the forms. For example; if the cause of whiteness in snow or froth be inquired, and it be rendered thus, that the subtile intermixture of air and water is the cause, it is well rendered; but nevertheless, is this the form of whiteness? No; but it is the efficient, which is ever but "*vehiculum formæ*."‡ This part of Metaphysic I do not find laboured and performed: whereat I marvel not: because I hold it not possible to be invented by that course of invention which hath been used; in regard that men, which is the root of all error, have made too untimely a departure and too remote a recess from particulars.

But the use of this part of Metaphysic, which I report as deficient, is of the rest the most excellent in two respects; the one, because it is the duty and virtue of all knowledge to abridge the infinity of individual experience, as much as the conception of truth will permit, and to remedy the complaint

* He formed man of the dust of the ground, and breathed into his nostrils the breath of life.

† Let the waters bring forth; let the earth bring forth.

‡ The vehicle or supporter of its form.

of "vita brevis, ars longa;"* which is performed by uniting the notions and conceptions of science. For knowledges are as pyramids, whereof history is the basis. So of Natural Philosophy, the basis is natural history; the stage next the basis is Physic, the stage next the vertical point is Metaphysic. As for the vertical point, "Opus quod operatur Deus a principio usque ad finem,"† the summary law of nature, we know not whether man's inquiry can attain unto it. But these three be the true stages of knowledge, and are to them that are depraved no better than the giants' hills:

Ter sunt conati imponere Pelio Ossam,
Scilicet, atque Ossæ frondosum involvere Olympum.‡

But to those which refer all things to the glory of God, they are as the three acclamations, "Sancte, sancte, sancte;"§ holy in the description or dilatation of his works; holy in the connexion or concatenation of them; and holy in the union of them in a perpetual and uniform law. And therefore the speculation was excellent in Parmenides and Plato, although but a speculation in them, that all things by scale did ascend to unity. So then always that knowledge is worthiest which is charged with least multiplicity; which appeareth to be Metaphysic; as that which considereth the simple forms or differences of things, which are few in number, and the degrees and co-ordinations whereof make all this variety.

The second respect, which valueth and commendeth this part of Metaphysic, is that it doth enfranchise the power of man unto the greatest liberty and possibility of works and effects. For Physic carrieth men in narrow and restrained ways, subject to many accidents of impediments, imitating the ordinary flexuous courses of nature; but "latæ undique sunt sapientibus viæ:"|| to sapience, which was anciently defined to

* Life is short, art is long.

† The work which God worketh from the beginning to the end.

‡ Thrice they essayed in their gigantic might
To heave up Ossa on mount Pelion's height,
Then roll Olympus upon Ossa's crown
With all its naked rocks and forests brown.

§ Holy, holy, holy.

|| The paths of the wise are extended in every direction.

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he "rerum divinarum et humanarum scientia,"* there is ever choice of means : for physical causes give light to new invention "in simili materia."† But whosoever knoweth any form, knoweth the utmost possibility of superinducing that nature upon any variety of matter ; and so is less restrained in operation, either to the basis of the matter, or the condition of the efficient : which kind of knowledge Solomon likewise, though in a more divine sense, elegantly describeth : "Non arctabuntur gressus tui, et currens non habebis offendiculum."‡ The ways of sapience are not much liable either to particularity or chance.

As for the Second Part of Metaphysic, the inquiry into Final Causes (that is, the ends or purposes of nature), Bacon complains that it has been usually assigned, not to Metaphysic, but to Physic. And "this misplacing," he adds, "hath caused a deficiency, or at least a great improvidence, in the sciences themselves. For the handling of Final Causes, mixed with the rest, in physical inquiries hath intercepted the severe and diligent inquiry of all real and physical causes, and given men the occasion to stay upon these satisfactory§ and specious causes, to the great arrest and prejudice of further discovery. For this I find done not only by Plato, who ever anchoreth upon that shore, but by Aristotle, Galen, and others, which do usually likewise fall upon those

* The knowledge of divine and human things.

† In similar materials.

‡ Thy ways shall not be straitened, and thou shalt not have a stumbling-block in thy course.

§ That is, causes that satisfy although they ought not. In the *De Augmentis*, the phrase is "speciosis et umbratilibus causis." The supposed final causes may be said to satisfy as a shadow satisfies. They satisfy the discernment that cannot distinguish between the shadow and the substance. So, lower down, we shall find the syllogism, although stated to be powerless for the establishment of principles in natural philosophy, yet admitted to be even there of use "by way of argument or satisfactory reason." And it is evident that the mind may often be satisfied by an argument which is not absolutely conclusive.

flats of discoursing causes. For to say that the hairs of the eyelids are for a quickset and fence about the sight ; or, that the firmness of the skins and hides of living creatures is to defend them from the extremities of heat or cold ; or, that the bones are for the columns or beams whereupon the frames of the bodies of living creatures are built ; or, that the leaves of trees are for the protecting of the fruit ; or, that the clouds are for watering of the earth ; or, that the solidness of the earth is for the station and mansion of living creatures ; and the like ; is well inquired and collected in Metaphysic ; but in Physic they are impertinent. Nay, they are indeed but resources and hinderances to stay and slug the ship from farther sailing, and have brought this to pass, that the search of the physical causes hath been neglected and passed in silence." He professes, however, not to speak thus as holding either that those final causes are not true, or that they are not worthy to be inquired into. He would only have them kept within their own province, and out of that of physical causes. Men, he observes, are extremely deceived if they think that there is any enmity or repugnancy at all between the two. " For the cause rendered, that the hairs about the eyelids are for the safeguard of the sight, doth not impugn the cause rendered, that pilosity is incident to orifices of moisture. . . . Nor the cause rendered, that the firmness of hides is for the armour of the body against extremities of heat or cold, doth not impugn the cause rendered, that contraction of pores is incident to the outwardest parts in regard of their adjacence to foreign or unlike bodies. And so of the rest ; both causes being true and compatible ; the one declaring an intention, the other a consequence only."

What remains of this Third Book need only be very briefly noticed. Operative Philosophy is divided, like Speculative, into two parts ; Mechanic, corresponding to Physic ; and Magic, corresponding to Metaphysic. But by Magic Bacon understands nothing more than that science which, as he defines it, deduces the knowledge of hidden forms for the production of wonderful effects.

and by conjoining, as we are wont to say, the active with the passive (that is, the energy of the living experimenter with the powers and capabilities of dead matter) reveals or brings forth the miracles of nature. Lastly, he comes to Mathematics; which, he observes, is commonly arranged as a third principal part along with Physic and Metaphysic, but which he conceives ought properly to be considered only as an Appendix to the latter. "But," he afterwards adds (to adopt Shaw's translation), "as we regard not only truth and order, but also the benefits and advantages of mankind, it seems best, since Mathematics is of great use in Physics, Metaphysics, Mechanics, and Magics, to make it an appendage or auxiliary to them all. And this we are in some measure obliged to do, from the fondness and towering notions of mathematicians, who would have their science preside over Physics. It is a strange fatality that Mathematics and Logics, which ought to be but handmaids to Physics, should boast their certainty before it, and even exercise dominion against it." The Mathematics are stated to be either Pure or Mixed. And then comes in the *Advancement* the following concluding paragraph, which is omitted in the *De Augmentis* :—

In the mathematics I can report no deficiency, except it be that men do not sufficiently understand the excellent use of the pure mathematics, in that they do remedy and cure many defects in the wit and faculties intellectual. For, if the wit be dull, they sharpen it; if too' wandering, they fix it; if too inherent in the sense, they abstract it. So that, as tennis is a game of no use in itself, but of great use in respect it maketh a quick eye and a body ready to put itself into all postures; so, in the mathematics, that use which is collateral and intervenient is no less worthy than that which is principal and intended.

The Fourth Book of the *De Augmentis* contains three Chapters; and the new matter is of considerably greater amount than the old. After a brief exordium, it proceeds :—

We come, therefore, now to that knowledge whereunto the ancient oracle directeth us, which is the knowledge of our-

selves; which deserveth the more acute handling, by how much it toucheth us more nearly. This knowledge, as it is the end and term of natural philosophy in the intention of man, so notwithstanding, it is but a portion of natural philosophy in the continent of nature; and generally let this be a rule, that all partitions of knowledges be accepted rather for lines and veins, than for sections and separations; and that the continuance and entireness of knowledge be preserved. For the contrary hereof hath made particular sciences to become barren, shallow, and erroneous, while they have not been nourished and maintained from the common fountain. So we see Cicero the orator complained of Socrates and his school, that he was the first that separated philosophy and rhetoric; whereupon rhetoric became an empty and verbal art. So we may see that the opinion of Copernicus touching the rotation of the earth, which astronomy itself cannot correct, because it is not repugnant to any of the phenomena, yet natural philosophy may correct. So we see also that the science of medicine, if it be destituted and forsaken by natural philosophy, it is not much better than an empirical practice.

In the *De Augmentis* the condemnation of the Copernican doctrine of the rotation of the earth is retained without further alteration than the insertion of the parenthesis, "*quae nunc quoque invaluit*" (which now also hath come to be prevalent).

The Science of Man is in the first place divided by Bacon into the Philosophy of Humanity properly so called, being that which regards man segregated, or as an individual; and, Civil Philosophy, or that which regards men congregated in society. And the former is subdivided into the knowledge which concerns the Body, and the knowledge which concerns the Mind. But, besides these, there is also the General Science of the Nature and State of Man, comprehending those things which are common both to the body and the mind; and it likewise is divisible into two branches; the one occupying itself with the undivided nature of man, the other with the connexion between the mind and the body. The former, therefore, may be called the doctrine of the Person of man; the latter, the doctrine of the Confederacy. Further, the doctrine of the Person comprehends first, contemplations respecting the Miseries of the Human

race; secondly, contemplations respecting the Prerogatives and Excellencies. So also, "as all leagues and amities consist of mutual intelligence and mutual offices," the knowledge of the Confederacy between the body and the mind may be divided into two parts; the first teaching how the one discloseth the other, the second, how the one worketh upon the other; the former the doctrine of Discovery or Indication, the latter that of Impression. From the doctrine or science of Discovery have sprung the two arts of Physiognomy and the Exposition of Dreams; both arts of prediction or prenotation, "whereof the one is honoured with the inquiry of Aristotle, and the other of Hippocrates." "And," adds Bacon, "although they have of later time been used to be coupled with superstitious and fantastical arts, yet, being purged and restored to their true state, they have both of them a solid ground in nature, and a profitable use in life." The doctrine of Impression, again, hath the same antistrophe with that of Discovery; "for the consideration is double; either how and how far the humours and effects of the body do alter or work upon the mind; or, again, how and how far the passions or apprehensions of the mind do alter or work upon the body." The former subdivision may be considered as answering to Physiognomy; the latter to the philosophy of Dreams.

The reader may perceive, from this specimen, how much Bacon retained of the manner of thinking characteristic of the schoolmen, whom he held in such contempt; and also, perhaps, how insufficient this method of distinctions is to exhaust or completely expound the subject to which it is applied. The truth is, that the principle of subdivision upon which it proceeds may in all cases be carried on *ad infinitum*; and, with all its parade of thorough investigation, stop where it may, it is never really at the end of its work. Logically at least, that is, in thought, if not in the actual state of things, the last subdivision will always be further divisible: it must always contain a positive and a negative in reference to any new consideration with which the mind may choose to connect it.

Proceeding now, in the Second Chapter, to the Science

of the Body of man, our author divides that into four kinds:—the art of Medicine, which regards health; the Cosmetic art, or art of decoration, which regards beauty; the Athletic art, or art of activity, which regards strength; and the Voluptuary art, which regards pleasure. Here is a part of what follows on the art of Medicine, as it stands in the *Advancement*, from which it is almost literally translated in the *De Augmentis*:—

The ancient opinion that man was microcosmus, an abstract or model of the world, hath been fantastically strained by Paracelsus and the alchemists, as if there were to be found in man's body certain correspondences and parallels, which should have respect to all varieties of things, as stars, planets, minerals, which are extant in the great world. But thus much is evidently true, that of all substances which nature hath produced, man's body is the most extremely compounded: for we see herbs and plants are nourished by earth and water; beasts for the most part by herbs and fruits; man by the flesh of beasts, birds, fishes, herbs, grains, fruits, water, and the manifold alterations, dressings, and preparations of these several bodies, before they come to be his food and aliment. Add hereunto, that beasts have a more simple order of life, and less change of affections, to work upon their bodies: whereas man in his mansion, sleep, exercise, passions, hath infinite variations: and it cannot be denied but that the body of man of all other things is of the most compounded mass. The soul on the other side is the simplest of substances, as is well expressed:

— Purumque reliquit

Æthereum sensum atque aurâ simplicis ignem.*

So that it is no marvel though the soul so placed enjoy no rest, if that principle be true, that “*Motus rerum est rapidus extra locum, placidus in loco.*”† But to the purpose: this variable composition of man's body hath made it as an instrument easy to distemper; and therefore the poets did well to conjoin music and medicine in Apollo: because the office of medicine is but to tune this curious harp of man's body and to reduce it to harmony. So then the subject being so variable, hath made

* But incorrupt he left our heavenly part,
And the pure flame God kindles in the heart.

† The motion of things is rapid when out of place, placid when in place.

the art by consequence more conjectural; and the art being conjectural hath made so much the more place to be left for imposture.

And therefore I cannot much blame physicians, that they use commonly to intend some other art or practice, which they fancy more than their profession. For you shall have of them antiquaries, poets, humanists, statesmen, merchants, divines, and in every of these better seen than in their profession; and no doubt upon this ground, that they find that mediocrity and excellency in their art maketh no difference in profit or reputation towards their fortune; for the weakness of patients, and sweetness of life, and nature of hope, maketh men depend on physicians with all their defects. But, nevertheless, these things which we have spoken of, are courses begotten between a little occasion, and a great deal of sloth and default; for if we will excite and awake our observation, we shall see in familiar instances what a predominant faculty the subtilty of spirit hath over the variety of matter or form. Nothing more variable than faces and countenances; yet men can bear in memory the infinite distinctions of them; nay, a painter with a few shells of colours, and the benefit of his eye and habit of his imagination, can imitate them all that ever have been, are, or may be, if they were brought before him. Nothing more variable than voices; yet men can likewise discern them personally: nay, you shall have a buffoon or pantomimus will express as many as he pleaseth. Nothing more variable than the differing sounds of words; yet men have found the way to reduce them to a few simple letters. So that it is not the insufficiency or incapacity of man's mind, but it is the remote standing or placing thereof, that breedeth these mazes and incomprehensions; for as the sense afar off is full of mistaking, but is exact at hand, so is it of the understanding; the remedy whereof is, not to quicken or strengthen the organ, but to go nearer to the object; and therefore there is no doubt but if the physicians will learn and use the true approaches and avenues of nature, they may assume as much as the poet saith:

Et quoniam variant morbi, variabimus artes;

*Mille mali species, mille salutis erunt.**

Which that they should do, the nobleness of their art doth deserve: well shadowed by the poets, in that they made *Æscu-*

* Diseases vary, we must vary art,
And thousand cures to thousand pains impart.

lapius to be the son of the Sun, the one being the fountain of life, the other as the second stream: but infinitely more honoured by the example of our Saviour, who made the body of man the object of his miracles, as the soul was the object of his doctrine. For we read not that ever he vouchsafed to do any miracle about honour or money, except that one for giving tribute to Cæsar; but only about the preserving, sustaining, and healing the body of man.

In the *De Augmentis*, what follows the two Latin lines (from Ovid) is transferred to the commencement of the passage.

Medicine is divided into three kinds, according as its object is the preservation of health, the cure of diseases, or the prolongation of life; and much more is added on each of these heads, which our limits compel us to pass over. A few observations on the Cosmetic, Athletic, and Voluptuary arts close the chapter.

In Chapter Third that portion of Human Philosophy which concerns the Mind or Soul is first divided into two parts; that which treats of the rational soul, and that which treats of the irrational; and then into other two; "the one, that inquireth of the substance or nature of the soul or mind; the other, that inquireth of the faculties or functions thereof." The science of Divination and the science of Fascination are considered as appendices to the science of the Faculties. Fascination is defined to be the power and action of the imagination making itself to be felt upon other bodies than the body of the imaginant. "Wherein," our author proceeds, "the school of Paracelsus, and the disciples of pretended natural magic, have been intemperate, as they have exalted the power of the imagination to be much one with the power of miracle-working faith. Others, that draw nearer to probability, calling to their view the secret passages of things, and especially of the contagion that passeth from body to body, do conceive it should likewise be agreeable to nature that there should be some transmissions and operations from spirit to spirit without the mediation of the senses; whence the conceits have grown, now almost made civil [popularly believed], of

the mastering spirit, and the force of confidence, and the like." In the *De Augmentis* are added, as other examples, men accounted unlucky and ominous, and strokes of love and of envy. The passage in the *Advancement* goes on :—

Incident unto this is the inquiry how to raise and fortify the imagination : for if the imagination fortified have power, then it is material to know how to fortify and exalt it. And herein comes in crookedly and dangerously a palliation of a great part of ceremonial magic. For it may be pretended that ceremonies, characters, and charms, do work, not by any tacit or sacramental contract with evil spirits, but serve only to strengthen the imagination of him that useth it; as images are said by the Roman church to fix the cogitations, and raise the devotions of them that pray before them. But for mine own judgment, if it be admitted that imagination hath power, and that ceremonies fortify imagination, and that they be used sincerely and intentionally for that purpose; yet I should hold them unlawful, as opposing to that first edict which God gave unto man, "In sudore vultus comedes panem tuum."* For they propound those noble effects, which God hath sent forth unto man to be brought at the price of labour, to be attained by a few easy and slothful observances.

Bacon's belief in the power of imagination, which he here describes, and which may be regarded as of the same nature with the modern Mesmerism, is still more evident from other parts of his writings, and especially from the Tenth Century of the *Sylva Sylvarum*. And there, it may be remarked, he expresses no scrupulosity about the lawfulness of employing the power; on the contrary, he throws out various suggestions for strengthening and exalting it.

This Third Chapter is concluded by some observations, which are not in the *Advancement*, on two branches of knowledge described as having a reference principally to the faculties of the inferior or sensible soul (or that which man has in common with the brutes); namely, the doctrine of Voluntary Motion and the doctrine of Sense and Sensibility. In the treatment of the latter, there are two very important matters, Bacon con-

* In the sweat of thy brow shalt thou eat thy bread.

ceives, that have been neglected ; the difference between sense and perception, and the form of light. By perception, which he says resides in almost all natural bodies, he seems to mean nearly the same thing that in modern chemistry is called elective affinity ; although he also confounds with that some of the effects of gravitation, of heat, and even of the principle of vegetable and animal life. In regard to light, he complains that its radiations have been treated of, but not their origin ; and this and other defects he traces to the treatment of perspective as simply a branch of the mathematics. By the *form* of light Bacon must be understood to mean here nearly what would in common parlance be called its nature. He wishes the inquiry to be extended from the mere effects of light to its constitution or substance—to the examination, as he puts it, of what it is that is common to the emanations perceived by the eye to proceed from the sun and those perceived to proceed from rotten wood or the putrid scales of fish. Modern philosophy has turned very little of its attention to investigations of this latter description ; and those who are fondest of proclaiming Bacon as the father of modern physics are not usually anxious to exhibit him as patronising such speculations. But they enter largely into his system of philosophy as he has himself expounded it.

The Fifth Book of the *De Augmentis* is also extended to more than double the space occupied by the same portion of the subject in the *Advancement of Learning*. It consists of five chapters. This Fifth Book makes an especially important part of Bacon's exposition both of his own system and of his views of the old logic.

He begins by observing that the doctrine of the Intellect of man and that of his Will are as it were twins by birth. For purity of intellectual light and freedom of will began together and perished together. Nor is there in the whole universe of nature so intimate a sympathy as that between truth and goodness. The more shame therefore to learned men, if for knowledge they be like winged angels, but in their desires like serpents crawl-

ing in the dust; bearing about with them minds resembling, indeed, a mirror, but a mirror foully stained. Of the two parts into which the Science of the Human Mind is commonly divided, one, Logic, is concerned with the understanding and the reason; the other, Ethics, with the will, appetites, and affections. The passage in the *De Augmentis* then proceeds nearly as in the *Advancement*:—

It is true that the imagination is an agent or “nuncius,”* in both provinces, both the judicial and the ministerial. For sense sendeth over to imagination before reason have judged: and reason sendeth over to imagination before the decree can be acted: for imagination ever precedeth voluntary motion. Saving that this Janus of imagination hath differing faces: for the face towards reason hath the print of truth, but the face towards action hath the print of good; which nevertheless are faces,

Quales decet esse sororum.†

Neither is the imagination simply and only a messenger; but is invested with or at leastwise usurpeth no small authority in itself, besides the duty of the message. For it was well said by Aristotle, “That the mind hath over the body that commandment, which the lord hath over a bondman; but that reason hath over the imagination that commandment which a magistrate hath over a free citizen;” who may come also to rule in his turn. For we see that, in matters of faith and religion, we raise our imagination above our reason; which is the cause why religion sought ever access to the mind by similitudes, types, parables, visions, dreams. And again, in all persuasions that are wrought by eloquence, and other impressions of like nature, which do paint and disguise the true appearance of things, the chief recommendation unto reason is from the imagination.

The part of Human Philosophy, which is rational, is of all knowledges, to the most wits, the least delightful, and seemeth but a net of subtilty and spinosity. For as it was truly said, that knowledge is “pabulum animi;”‡ so in the nature of

* Messenger.

† As the faces of sisters should be.

‡ Food of the mind.

men's appetite to this food, most men are of the taste and stomach of the Israelites in the desert, that would fain have returned "ad ollas carniū,"* and were weary of manna; which, though it were celestial, yet seemed less nutritive and comfortable. So generally men taste well knowledges that are drenched in flesh and blood, civil history, morality, policy, about the which men's affections, praises, fortunes, do turn and are conversant; but this same "lumen siccū"† doth parch and offend most men's watery and soft natures. But, to speak truly of things as they are in worth, rational knowledges are the keys of all other arts: for as Aristotle saith aptly and elegantly, "that the hand is the instrument of instruments, and the mind is the form of forms:" so these be truly said to be the art of arts: neither do they only direct, but likewise confirm and strengthen; even as the habit of shooting doth not only enable to shoot a nearer shoot, but also to draw a stronger bow.

The Logical Arts, or, as they are called in the *Advancement*, the Arts Intellectual, are declared to be four in number; "divided according to the ends whereunto they are referred. For man's labour is to invent that which is sought or propounded; or to judge that which is invented; or to retain that which is judged; or to deliver over that which is retained. So as the arts must be four: art of Inquiry or Invention; art of Examination or Judgment; art of Custody or Memory; and art of Elocution or Tradition." In the *De Augmentis* the expression in this last sentence is *Artes Rationales* (the Rational Arts); and it must be borne in mind that by Logic Bacon understands the whole science of the operations of the Reason and the Understanding.

It is in the Second Chapter, which treats of the art of Invention, that the additions made in the Latin work are the most considerable. The commencing portion of the disquisition, however, is translated with little alteration from the *Advancement*:—

Invention is of two kinds, much differing; the one of arts and sciences; and the other, of speech and arguments. The former of these I do report deficient; which seemeth to me to be such a deficiency as if, in the making of an inventory touch-

* To the flesh-pots. † Dry light.

ing the estate of a defunct, it should be set down, that there is no ready money. For as money will fetch all other commodities, so this knowledge is that which should purchase all the rest. And like as the West Indies had never been discovered if the use of the mariner's needle had not been first discovered, though the one be vast regions, and the other a small motion; so it cannot be found strange if sciences be no farther discovered, if the art itself of invention and discovery hath been passed over.

That this part of knowledge is wanting, to my judgment standeth plainly confessed; for first, logic doth not pretend to invent sciences, or the axioms of sciences, but passeth it over with a "cuique in sua arte credendum."* And Celsus acknowledgeth it gravely, speaking of the empirical and dogmatical sects of physicians, "That medicines and cures were first found out, and then after the reasons and causes were discoursed; and not the causes first found out, and by light from them the medicines and cures discovered." And Plato, in his *Theætetus*, noteth well, "That particulars are infinite, and the higher generalities give no sufficient direction; and that the pith of all sciences, which maketh the artsman differ from the inexpert, is in the middle propositions, which in every particular knowledge are taken from tradition and experience." And therefore we see, that they which discourse of the inventions and originals of things, refer them rather to chance than to art, and rather to beasts, birds, fishes, serpents, than to men.

Dictamnum genetrix Cretæa carpit ab Ida,
 Puberibus caulem foliis et flore comantem
 Purpureo: non illa feris incognita capris
 Gramina, cum tergo volucres hæere sagittæ.†

So that it was no marvel, the manner of antiquity being to consecrate inventors, that the *Ægyptians* had so few human idols in their temples, but almost all brute.

* Every man is to be believed in his own art.

† But now the goddess mother, moved with grief
 And pierced with pity, hastens her relief;
 A branch of healing dittany she brought,
 Which in the Cretan fields with care she sought:
 Rough is the stem, which woolly leaves surround;
 The leaves with flowers, the flowers with purple crowned;
 Well known to wounded goats: a sure relief
 To draw the pointed steel, and ease the grief.

Omnigenumque Deum monstra, et Iatrator Anubis,
Contra Neptunum, et Venerem, contraque Minervam, &c.*

And, if you like better the tradition of the Grecians, and ascribe the first inventions to men, yet you will rather believe that Prometheus first struck the flints, and marvelled at the spark, than that when he first struck the flints he expected the spark, and therefore we see the West Indian Prometheus had no intelligence with the European, because of the rareness with them of flint that gave the first occasion. So as it should seem that hitherto men are rather beholden to a wild goat for surgery, or to a nightingale for music, or to the ibis for some part of physic, or to the pot-lid that flew open for artillery, or generally to chance or anything else, than to logic, for the invention of arts and sciences. Neither is the form of invention which Virgil describeth much other :

Ut varias usus meditando extunderet artes
Paulatim.†

For if you observe the words well, it is no other method than that which brute beasts are capable of, and do put in use ; which is a perpetual intending or practising some one thing, urged and imposed by an absolute necessity of conservation of being : for so Cicero saith very truly, " Usus uni rei deditus et naturam et artem sæpe vincit."‡ And therefore if it be said of men,

— Labor omnia vincit
Improbis, et duris urgens in rebus egestas!§

* They worship Gods of every monstrous shape,
The bull, the dog, the ibis, and the ape ;
And set these horrid deities above
The lovely progeny of mighty Jove.

† That old Experience pondering on its store
And turning all its treasures o'er and o'er,
By slow degrees should gain Invention's part
And work its way to new and wondrous art.

‡ Experience and practice, devoted to one subject, often overcome both nature and art.

§ O'er all things labour triumphs in the end ;
To urgent need all difficulties bend.

It is likewise said of beasts, "Quis psittaco docuit suum χαῖρις?"* Who taught the raven in a drought to throw pebbles into a hollow tree, where she espied water, that the water might rise so as she might come to it? Who taught the bee to sail through such a vast sea of air, and to find the way from a field in flower a great way off, to her hive? Who taught the ant to bite every grain of corn that she burieth in her hill, lest it should take root and grow? Add then the word "extundere,"† which importeth the extreme difficulty, and the word "paulatim,"‡ which importeth the extreme slowness, and we are where we were, even amongst the Ægyptians' gods; there being little left to the faculty of reason, and nothing to the duty of art, for matter of invention.

Secondly, it is argued, the same thing is completely demonstrated by that form of induction which the old logic propounds, "and," it is added in the *Advancement*, "which seemeth familiar with Plato." This form of Induction, "whereby the principles of sciences may be pretended to be invented, and so the middle propositions by derivations from the principles," is declared to be "utterly vicious and incompetent." "For," it is added, "to conclude upon an enumeration of particulars, without instance contradictory, is no conclusion, but a conjecture; for who can assure, in many subjects, upon those particulars which appear of a side, that there are not other on the contrary side which appear not?" As has been already explained, Bacon entirely mistook the nature of the old logical deduction, in which (as in every other form of syllogism) the conclusion was perfectly commensurate with the premisses, and in which the enumeration of particulars, being complete for its purpose, neither required nor could admit the introduction of contradictory instances. It is only in his own so called Induction that the conclusion is of the nature of a conjecture. Exactly the reverse of what he asserts of the two is the truth: it is the Baconian Induction that concludes pre-

* Who taught its "good-morrow" to the parrot? Persius answers, "Hunger, the master of art and bestower of genius."

† To work out.

‡ By slow degrees.

cariously (*concludit precario*); the Aristotelian always concludes necessarily (*concludit necessario*).

In the third place, Bacon contends that, even if some general principles may be rightly established by the induction of the old logic, yet inferior axioms cannot be correctly and safely deduced from them by the syllogism, at least in the physical sciences. "It is true," he goes on, "that in sciences popular, as moralities, laws, and the like,—yea, and divinity, because it pleaseth God to apply himself to the capacity of the simplest,—that form may have use; and in natural philosophy likewise, by way of argument or satisfactory reason—*quae assensum parit, operis effoeta est* [which wins assent, but works no effect out of the mind]; but the subtilty of nature and operations will not be enchained in those bonds." So that, he adds in the *De Augmentis*, the syllogism entirely failing here, nothing will serve except the true and reformed induction, for establishing either general principles or inferior propositions. Then he repeats, nearly in the same words, what we have already had occasion to quote from the *Distributio*, or Plan, of the *Instauration*, about propositions consisting of words, and words being but the counters or marks of popular notions of things. And he winds up the paragraph with a favourite illustration: referring to the denial by many of the ancient philosophers of any certainty of knowledge or comprehension, and the opinion held by them "that the knowledge of man extended only to appearances and probabilities," he observes, that, instead of charging the deceit upon the senses, as they were wont to do, they ought to have charged it upon the manner of collecting and concluding upon the reports of the senses: "this," he says, "I speak not to disable [that is, to depreciate] the mind of man, but to stir it up to seek help; for no man, be he never so cunning or practised, can make a straight line or perfect circle by steadiness of hand, which may be easily done by help of a ruler or compass."

In the *Advancement of Learning*, the subject is now dropped in these words:—"This part of Invention concerning the Invention of Sciences, I purpose, if God

give me leave, hereafter to propound, having digested it into two parts; whereof the one I term *Experientia Literata*, and the other *Interpretatio Naturae*; the former being but a degree and rudiment of the latter. But I will not dwell too long, nor speak too great upon a promise." In the *De Augmentis*, written, or at least published, seventeen years later, and after the *Novum Organum* had appeared, we have instead, immediately after the sentence about the ruler and compass, a statement to the following effect:—"This is that very thing which we are engaged with, and endeavouring with all possible pains to bring about; namely that the mind may by art be made equal to nature; and that there may be found some art of discovery and direction, which may disclose other arts, with their axioms and operations, and place them before our eyes." This Art of Discovery, or Indication, we are further informed, has two parts; for Discovery proceeds either from experiments to experiments, or from experiments to axioms, which may again point out new experiments. It is the former of these two kinds of Discovery or Invention that Bacon calls *Experientia Literata*, that is, Experience learnedly or scientifically conducted: the latter he calls *Interpretatio Naturae, sive Novum Organum* (the Interpretation of Nature, or New Instrument). The former, moreover, he considers to be not so much an art, properly so called, or part of philosophy, as a certain species of sagacity; whence he sometimes designates it the Chace of Pan (*Venatio Panis*), in allusion to the notion of that divinity being the representative of universal nature.* And, he goes on, as there are three ways in which a man may walk; by groping in the dark; or by being led by another person, when he can see but imperfectly;† or

* See vol. I. pp. 97—140.

† Not, however, necessarily or probably, from being "weak-sighted" (as Wats has it), or "dim-sighted" (as it is given by Shaw). The Latin is "*ipse parum videns*" (*he himself seeing little*) it may be from the obscurity of the place. His eyes may be as good as those of his guide; but the latter is familiar with the road, which he is not.

by directing his steps for himself with the assistance of a light; so may experiments be made either without any method at all; or according to a certain direction and order; or finally, in the full light of philosophy. The direction and order is what is to be understood by the *Experientia Literata*; the light must be sought from the *Novum Organum*.

The rest of the Chapter is occupied with the exemplification and illustration of this art of Scientific Experimenting; which is stated to proceed principally either by variation of the experiment; or by its production (that is, its repetition or continuation); or by its translation or transference (from nature or accident to art, or from one art to another, or from a part of an art to a different part of the same art); or by its inversion; or by its compulsion (that is, its being carried out to the annihilation or privation of the natural virtue or power which it is its purpose to test); or by its application; or by its copulation or conjunction with other experiments; or, finally, by chance experimenting (*per sortes experimenti*). As a specimen we will give what is said upon the Variation of experiments, adopting Shaw's translation, which is here sufficiently accurate:—

Experiments are varied first in the subject; as when a well known experiment, having rested in one certain substance, is tried in another of the like kind: thus the making of paper is hitherto confined to linen, and not applied to silk, unless among the Chinese; nor to hair-stuffs and camblets; nor to cotton and skins: though these three seem to be more unfit for the purpose, and so should be tried in mixture, rather than separate. Again, engrafting is practised in fruit trees, but rarely in wild ones; yet an elm grafted upon an elm, is said to produce great foliage for shade. Insition likewise in flowers is very rare, though now the experiment begins to be made upon musk-roses; which are successfully inoculated upon common ones. We also place the variations on the side of the thing, among the variations in the matter. Thus we see a scion grafted upon the trunk of a tree, thrives better than if set in earth: and why should not onion seed, set in a green onion, grow better, than when sown in the ground by itself; a root

being here substituted for the trunk, so as to make a kind of insition in the root?

An experiment may be varied in the efficient. Thus, as the sun's rays are so contracted by a burning-glass, and heightened to such a degree, as to fire any combustile matter: may not the rays of the moon, by the same means, be actuated to some small degree of warmth; so as to show whether all the heavenly bodies are potentially hot? and as luminous heats are thus increased by glasses: may not opake heats, as of stones and metals, before ignition, be increased likewise? or is there not some proportion of light here also? amber and jet, chafed, attract straws; whence query if they will not do the same when warmed at the fire?

An experiment may be varied in quantity; wherein very great care is required, as being subject to various errors. For men imagine, that upon increasing the quantity, the virtue should increase proportionably: and this they commonly postulate as a mathematical certainty, and yet it is utterly false. Suppose a leaden ball, of a pound weight, let fall from a steeple, reaches the earth in ten seconds; will a ball of two pounds, where the power of natural motion, as they call it, should be double, reaches it in five? No: they will fall almost in equal times; and not be accelerated according to quantity. Suppose a drachm of sulphur would flux half a pound of steel; will therefore an ounce of sulphur flux four pounds of steel? It is no consequence; for the stubbornness of the matter in the patient is more increased by quantity than the activity of the agent. Besides, too much, as well as too little, may frustrate the effect: thus in smelting and refining of metals, it is a common error to increase the heat of the furnace, or the quantity of the flux; but, if these exceed a due proportion, they prejudice the operation: because by their force and corrosiveness they turn much of the pure metal into fumes, and carry it off; whence there ensues, not only a loss in the metal, but the remaining mass becomes more sluggish and intractable. Men should therefore remember how *Æsop's* house-wife was deceived, who expected that by doubling her feed, her hen should lay two eggs a day; but the hen grew fat, and laid none. It is absolutely unsafe to rely upon any natural experiment, before proof be made of it, both in a less and a larger quantity.

The Chapter concludes thus, as if the *Novum Organum* had been yet to be written:—"Respecting the

Novum Organum we say nothing, nor do we here give any foretaste thereof; inasmuch as, seeing that it is of all the things we have taken in hand the greatest, it is our intention to make it the subject of an entire work, if the Divine favour shall permit."

The Third Chapter enters upon the subject of the Invention of Arguments; which, however, it is remarked, "is not properly an invention; for to invent is to discover that we know not, and not to recover or resummon that which we already know; and the use of this invention is no other, but, out of the knowledge whereof our mind is already possessed, to draw forth or call before us that which may be pertinent to the purpose which we take into our consideration. So as, to speak truly, it is no invention, but a remembrance or suggestion, with an application." Its parts are stated to be two; Promptuary and Topic; the latter of which is divided into General and Particular; and an example is given of Topic Particular in an enumeration of articles or heads of Inquiry on the subject of Gravity and Levity in natural philosophy.

Chapter Fourth is devoted to the Art of Judging. It is considerably altered in the *De Augmentis*. Conclusions are stated to be come to either by Induction or by Syllogism. As for the Old Induction, it is rejected as vicious; and the subject of Legitimate Induction, as it is designated, is remitted to the *Novum Organum*. The art of Judging by Syllogism, again, is declared to be nothing but the reduction of propositions to principles by middle terms; the principles being understood to be universally assented to and therefore to be exempted from question. The Art of Judgment is then divided into Analytics and the doctrine of Elenchs or Redargutions (that is, refutations). Of these last there are enumerated three species;—Elenchs of Sophisms, Elenchs of Interpretation (*Ermeniae*), and Elenchs of Images or Idols. The last only, as connected with the profoundest fallacies, are treated of at length; and a sketch is given of the doctrine of the *Idola Tribus* (Images of the Race), arising from the nature of the

general human mind ; the *Idola Specus* (Images of the Den) arising from the peculiar mental character of the individual ; and *Idola Fori* (Images of the Marketplace), arising out of words and names ; which is more fully detailed in the *Novum Organum*. The *Idola Theatri* (Images of the Theatre), springing from erroneous theories and philosophies, are merely mentioned, as admitting of being objected to. The substance of all this is also in the *Advancement of Learning*, although the different classes of *Idola* have not there the quaint names by which they are distinguished here and in the *Novum Organum*. Even in the *Advancement*, however, what are called "false appearances" in the text, are called "*idola animi*" in the margin.

The Fifth and last Chapter of this Fifth Book relates to the art of Preserving or Retaining Knowledge, and is nearly to the same effect in the *De Augmentis* as in the *Advancement*, though somewhat extended. The Art of Retention is divided into the doctrine of the Aids to Memory and the doctrine of the Memory itself. A few observations are made upon collections or digests of common-places, and upon systems of artificial memory.

The subject of the Sixth Book is what the author calls the Art of Tradition, or the Traditive Art, being that by which we express or transfer our knowledge to others. The discussion is lengthened in the *De Augmentis* to about four times its extent in the *Advancement*—partly, as we shall find, by the incorporation of a tract which had been written and published some years before the last-mentioned work. It is divided into four Chapters.

In the First, the Traditive Art is distributed into the doctrines or sciences of the Organ of discourse, of the Method of discourse, and of the Illustration or Adornment of discourse. The first comprehends the doctrine of the Notes or Marks of things, and the doctrine of Grammar, as regards both speaking and writing. Notes or Marks are either naturally suitable and significant, or arbitrary. Of the former kind are hieroglyphics and pictures ; of

the latter, what Bacon calls real characters, which he defines as being characters which express, not letters or words, but things and notions, but yet as distinguished from hieroglyphics by having in them nothing emblematical, and being in themselves altogether surd or inexpressive, as much as the letters of the alphabet, the meaning attached to them being simply the arbitrary imposition of custom or tacit agreement. Grammar, again,—“whereof,” he says, “the use in a mother tongue is small, in a foreign tongue more, but most in such foreign tongues as have ceased to be vulgar tongues, and are turned only to learned tongues,”—he divides into Literary and Philosophical; meaning by the former the Grammar of particular languages; by the latter, the doctrine of the analogy, not of words to one another, but of words to things, or to reason. Bacon’s Philosophical Grammar, however, would scarcely appear to be the same thing that is now understood by Philosophical or General Grammar, which aims at investigating the rationale of expressions and grammatical forms by the reduction of their diversities to certain common principles. He seems, as far as can be gathered from his somewhat imperfect and unsatisfactory exposition, to have contemplated rather the tracing of the peculiarities of different languages to corresponding peculiarities of national character. To Grammar is considered to belong every thing relating to the sound, the measure, and the accent of words, and to so much of poetry as lies in the verse. Lastly under the head of writing is noticed the subject of Ciphers, or secret writing; and here Bacon gives an account of a cipher of his own invention; devised by him, he says, when he was a young man at Paris; and still, he adds, appearing to him worthy of being preserved, seeing that it possesses the quality of the cipher in the highest degree, namely that all things may with it be signified in all forms (*omnia per omnia*), subject to no other disadvantage except that the writing involved is only one-fifth of that in which it is involved—in other words, that the cipher is five times as cumbrous as the

plain writing would be. The details must be sought in his own pages. They are given only in the *De Augmentis*.

In the Second Chapter, which is occupied with the doctrine of Method, there is not much added to the original disquisition in the *Advancement*. Method, it is observed, is commonly treated of as a part of Logic; and also as a part of Rhetoric, under the name of Disposition (or Arrangement); but it seems to deserve to be made a doctrine by itself, which may be designated the Wisdom, or Prudential Part, of the Traditive Art (*Prudentiam Traditivæ*). The following passage in the *Advancement* is somewhat extended in the *De Augmentis*:—

Neither is the method or the nature of the tradition material only to the use of knowledge, but likewise to the progression of knowledge: for since the labour and life of one man cannot attain to perfection of knowledge, the wisdom of the tradition is that which inspireth the felicity of continuance and proceeding. And therefore the most real diversity of method is of method referred to use, and method referred to progression: whereof the one may be termed magistral, and the other of probation.

The latter whereof seemeth to be “*via deserta et interclusa*.”* For, as knowledges are now delivered, there is a kind of contract of error between the deliverer and the receiver: for he that delivereth knowledge desireth to deliver it in such form as may be best believed, and not as may be best examined; and he that receiveth knowledge desireth rather present satisfaction than expectant inquiry; and so rather not to doubt than not to err: glory making the author not to lay open his weakness, and sloth making the disciple not to know his strength.

But knowledge that is delivered as a thread to be spun on ought to be delivered and intimated, if it were possible, in the same method wherein it was invented; and so is it possible of knowledge induced. But in this same anticipated and prevented knowledge no man knoweth how he came to the knowledge which he hath obtained. But yet, nevertheless, “*secundum majus et minus*,”† a man may revisit and descend

* A desert and secluded way.

† According to its being greater or less.

unto the foundations of his knowledge and consent; and so transplant it into another, as it grew in his own mind. For it is in knowledges as it is in plants: if you mean to use the plant, it is no matter for the roots; but if you mean to remove it to grow, then it is more assured to rest upon roots than slips; so the delivery of knowledges, as it is now used, is as of fair bodies of trees without the roots—good for the carpenter, but not for the planter. But if you will have sciences grow, it is less matter for the shaft or body of the tree, so you look well to the taking up of the roots: of which kind of delivery the method of the mathematics, in that subject, hath some shadow.

This genuine method, Bacon adds, he does not find to be generally either in use, or sought after. In the *Advancement* he calls it, in a marginal note, *Methodus Sincera, sive ad Filios Scientiarum* (the True Method, or that for the Sons of Science); in the *De Augmentis* it is more quaintly termed the Tradition of the Lamp, or the Method for the Sons (*Traditio Lampadis, sive Methodus ad Filios*).

From the observations that follow upon other diversities of method, it will be sufficient to select a paragraph or two. The following is nearly the same in the Latin as in the English:—

Another diversity of method, whereof the consequence is great, is the delivery of knowledge in aphorisms, or in methods; wherein we may observe that it hath been too much taken into custom, out of a few axioms or observations upon any subject to make a solemn and formal art, filling it with some discourses, and illustrating it with examples, and digesting it into a sensible method: but the writing in aphorisms hath many excellent virtues, whereto the writing in method doth not approach.

For first, it trieth the writer, whether he be superficial or solid; for aphorisms, except they should be ridiculous, cannot be made but of the pith and heart of sciences; for discourse of illustration is cut off; recitals of examples are cut off; discourse of connexion and order is cut off; descriptions of practice are cut off; so there remaineth nothing to fill the aphorisms but some good quantity of observation: and therefore no man can suffice, nor in reason will attempt to write aphorisms, but he that is sound and grounded. But in methods,

Tantum series juncturaque pollet,
Tantum de medio sumptis accedit honoris ;*

as a man shall make a great show of an art which, if it were disjointed, would come to little. Secondly, methods are more fit to win consent or belief, but less fit to point to action : for they carry a kind of demonstration in orb or circle, one part illuminating another, and therefore satisfy ; but particulars, being dispersed, do best agree with dispersed directions. And lastly, aphorisms, representing a knowledge broken, do invite men to inquire farther ; whereas methods, carrying the show of a total, do secure men, as if they were at farthest.

This last view was a favourite with Bacon. "I have heard his lordship say also," writes Rawley, in his Preface to the *Sylva Sylvarum*, "that one great reason why he would not put these particulars [the facts collected in that work] into any exact method (though he that looketh attentively into them shall find that they have a secret order) was because he conceived that other men would now think that they could do the like, and so go on with a further collection ; which, if the method had been exact, many would have despaired to attain by imitation."

The Third Chapter is devoted to the subject of Rhetoric, or the doctrine of the Illustration and Adornment of Discourse ; and the additions in the *De Augmentis* extend it to nearly ten times its length in the original English treatise. The beginning, however, is nearly the same as in the *Advancement* :—

Now we descend to that part which concerneth the illustration of tradition, comprehended in that science which we call Rhetoric, or art of eloquence ; a science excellent, and excellently well laboured. For although in true value it is inferior to wisdom, (as it is said by God to Moses, when he disabled himself for want of this faculty, "Aaron shall be thy speaker, and thou shalt be to him as God,") yet with people it is the more mighty : for so Solomon saith, "Sapiens corde appella-

* Skill and arrangement can such charms bestow
That commonplaces make a glorious show.

bitur prudens, sed dulcis eloquio majora reperiet;”* signifying that profoundness of wisdom will help a man to a name or admiration, but that it is eloquence that prevaieth in an active life. And so as to the labouring of it, the emulation of Aristotle with the rhetoricians of his time, and the experience of Cicero, hath made them in their works of rhetorics exceed themselves. Again the excellency of examples of eloquence in the orations of Demosthenes and Cicero, added to the perfection of the precepts of eloquence, hath doubled the progression in this art; and therefore the deficiencies which I shall note will rather be in some collections, which may as handmaids attend the art, than in the rules or use of the art itself.

Notwithstanding, to stir the earth a little about the roots of this science, as we have done of the rest; the duty and office of Rhetoric is to apply reason to imagination for the better moving of the will. For we see reason is disturbed in the administration thereof by three means: by illaqueation or sophism, which pertains to logic; by imagination or impression, which pertains to rhetoric; and by passion or affection, which pertains to morality. And as, in negotiation with others, men are wrought by cunning, by importunity, and by vehemency; so, in this negotiation within ourselves, men are undermined by inconsequences, solicited and importuned by impressions or observations, and transported by passions. Neither is the nature of man so unfortunately built as that those powers and arts should have force to disturb reason, and not to establish and advance it: for the end of logic is to teach a form of argument to secure reason and not to entrap it; the end of morality is to procure the affections to obey reason, and not to invade it; the end of Rhetoric is to fill the imagination, to second reason, and not to oppress it: for these abuses of arts come in but “*ex obliquo*,”† for caution.

And therefore it was great injustice in Plato, though springing out of a just hatred of the rhetoricians of his time, to esteem of Rhetoric but as a voluptuary art, resembling it to cookery that did mar wholesome meats, and help unwholesome by variety of sauces to the pleasure of the taste. For we see that speech is much more conversant in adorning that which is good than in colouring that which is evil; for there is no man

* The wise in heart shall be called prudent; but the sweet in speech shall attain greater things.

† Incidentally.

but speaketh more honestly than he can do or think: and it was excellently noted by Thucydides in Cleon, that because he used to hold on the bad side in causes of estate, therefore he was ever inveighing against eloquence and good speech; knowing that no man can speak fair of courses sordid and base. And therefore, as Plato said elegantly, "That Virtue, if she could be seen, would move great love and affection;" so, seeing that she cannot be showed to the sense by corporal shape, the next degree is to show her to the imagination in lively representation: for to show her to reason only in subtilty of argument was a thing ever derided in Chrysippus and many of the Stoics; who thought to thrust virtue upon men by sharp disputations and conclusions which have no sympathy with the will of man.

Again, if the affections in themselves were pliant and obedient to reason, it were true there should be no great use of persuasions and insinuations to the will, more than of naked proposition and proofs; but in regard of the continual mutinies and seditions of the affections,

Video meliora, proboque;
Deteriora sequor:*

reason would become captive and servile, if eloquence of persuasions did not practise and win the imagination from the affections' part, and contract a confederacy between the reason and imagination against the affections: for the affections themselves carry ever an appetite to good, as reason doth. The difference is, that the affection beholdeth merely the present; reason beholdeth the future and sum of time. And therefore, the present filling the imagination more, reason is commonly vanquished; but after that force of eloquence and persuasion hath made things future and remote appear as present, then upon the revolt of the imagination reason prevaieth.

We conclude, therefore, that Rhetoric can be no more charged with the colouring of the worst part, than logic with sophistry, or morality with vice. For we know the doctrines of contraries are the same, though the use be opposite. It appeareth also that logic differeth from Rhetoric, not only as the fist from the palm, the one close, the other at large; but much more in this, that logic handleth reason exact and in truth, and Rhetoric handleth it as it is planted in popular

* I see the best, and still the worst pursue.

opinions and manners. And therefore Aristotle doth wisely place Rhetoric as between logic on the one side, and moral or civil knowledge on the other, as participating of both : for the proofs and demonstrations of logic are toward all men indifferent and the same ; but the proofs and persuasions of Rhetoric ought to differ according to the auditors :—

Orpheus in sylvia, inter delphinas Arion :*

which application, in perfection of idea, ought to extend so far that, if a man should speak of the same thing to several persons, he should speak to them all respectively in several ways : though this politic part of eloquence in private speech it is easy for the greatest orators to want ; whilst, by the observing their well-graced forms of speech, they lose the volubility of application : and therefore it shall not be amiss to recommend this to better inquiry, not being curious whether we place it here or in that part which concerneth policy.

In the *Advancement* only a single example is given of each of three kinds of desiderata or deficiencies which are noticed ; in the *De Augmentis* the first and second kinds are illustrated by numerous examples. “ First,” Bacon begins (in both treatises), “ I do not find the wisdom and diligence of Aristotle well pursued, who began to make a collection of the popular signs and colours of good and evil, both simple and comparative, which are as the Sophisms of Rhetoric. . . . The defects in the labour of Aristotle are three : one, that there be but a few of many ; another that their elenchuses are not annexed and the third, that he conceived but a part of the use of them. For their use is not only in probation, but much more in impression. For many forms are equal in signification which are differing in impression ; as the difference is great in the piercing of that which is sharp and that which is flat, though the strength of the percussion be the same.” And then we have in the *De Augmentis* a translation, with additions, of the English tract published with the first and Second Editions of the *Essays* (1597 and 1598) entitled ‘ Of the Colours of Good and

* Equal to Orpheus in the listening woods,
And riding like Arion o’er the floods.

Evil, a Fragment ;' or otherwise, 'Places of Persuasion and Dissuasion.'*

This little tract, as printed in the modern editions of Bacon's works, is commonly headed by the following Letter to the Lord Mountjoy, which was first published in what is called Stephens's Second Collection (Letters, Memoirs, &c., 4to, Lond. 1734), and is curious as containing perhaps the freest expression that Bacon has any where ventured upon of his opinion of Aristotle :—

I send you the last part of the best book of Aristotle of Stagira, who, as your lordship knoweth, goeth for the best author. But saving the civil respect which is due to a received estimation, the man being a Grecian, and of a hasty wit, having hardly a discerning patience, much less a teaching patience, hath so delivered the matter, as I am glad to do the part of a good house-hen, which, without any strangeness, will sit upon pheasants' eggs. And yet perchance some that shall compare my lines with Aristotle's lines, will muse by what art, or rather by what revelation, I could draw these conceits out of that place. But I, that should know best, do freely acknowledge, that I had my light from him; for where he gave me not matter to perfect, at the least he gave me occasion to invent. Wherein as I do him right, being myself a man that am as free from envying the dead in contemplation, as from envying the living in action or fortune: so yet nevertheless still I say, and I speak it more largely than before, that in perusing the writings of this person so much celebrated, whether it were the impediment of his wit, or that he did it upon glory and affectation to be subtile, as one that if he had seen his own conceits clearly and perspicuously delivered, perhaps would have been out of love with them himself; or else upon policy, to keep himself close, as one that had been a challenger of all the world, and had raised infinite contradiction: to what cause soever it is to be ascribed, I do not find him to deliver and unwrap himself well of that he seemeth to conceive; nor be a master of his own knowledge. Neither do I for my part also, though I have brought in a new manner of handling this argument, to make it pleasant and lightsome, pretend so to have overcome the nature of the subject, but that the full understanding and use of it will be somewhat dark, and best pleasing

* See vol. i. pp. 17, &c.

the tastes of such wits as are patient to stay the digesting and soluting unto themselves of that which is sharp and subtile. Which was the cause, joined with the love and honour I bear to your lordship, as the person I know to have many virtues, and an excellent order of them, which moved me to dedicate this writing to your lordship after the ancient manner: choosing both a friend, and one to whom I conceived the argument was agreeable.

The following introduction to the *Colours* in the original edition is omitted in the *De Augmentis*:—

In deliberatives, the point is what is good and what is evil; and of good what is greater, and of evil what is less.

So that the persuader's labour is to make things appear good or evil, and that in higher or lower degree; which as it may be performed by true and solid reasons, so it may be represented also by colours, popularities, and circumstances, which are of such force as they sway the ordinary judgment either of a weak man, or of a wise man, not fully and considerably attending and pondering the matter. Besides their power to alter the nature of the subject in appearance, and so to lead to error, they are of no less use to quicken and strengthen the opinions and persuasions which are true: for reasons plainly delivered, and always after one manner, especially with fine and fastidious minds, enter but heavily and dully; whereas, if they be varied, and have more life and vigour put into them by these forms and insinuations, they cause a stronger apprehension, and many times suddenly win the mind to a resolution. Lastly, to make a true and safe judgment, nothing can be of greater use and defence to the mind than the discovering and reprehension of these colours, showing in what cases they hold, and in what they deceive; which, as it cannot be done but out of a very universal knowledge of the nature of things, so being performed, it so cleareth man's judgment and election, as it is the less apt to slide into any error.

The original *Colours* are ten in number; in the *De Augmentis*, besides other alterations, they are arranged in a new order; and two are added.

The following stands Fifth in the *De Augmentis*, and First in the original publication:—

Since all parties or sects challenge the pre-eminence of the first place to themselves, that to which all the rest with one consent give the second place, seems to be better than the

others. For every one seems to take the first place out of zeal to itself, but to give the second where it is really due.

So Cicero went about to prove the sect of Academics, which suspended all asseveration, for to be the best. "For," saith he, "ask a Stoic which philosophy is true, he will prefer his own: then ask him which approacheth (next) the truth, he will confess the Academics. So deal with the epicure that will scant endure the Stoic to be in sight of him: so soon as he hath placed himself he will place the Academics next him."

So if a prince took divers competitors to a place, and examined them severally whom next themselves they would rarest commend, it were like the ablest man should have the most second voices.

The fallax of this colour happeneth oft in respect of envy: for men are accustomed, after themselves, and their own fashion, to incline unto them which are softest and are least in their way, in despite and derogation of them that hold them hardest to it. So that this colour of meliority and pre-eminence is a sign of enervation and weakness.

Here is the Seventh of the *De Augmentis*, and the Fourth of the original edition:—

That which keeps a matter safe and entire is good: but what is destitute and unprovided of a retreat is bad. For, whereas, all ability of acting is good, not to be able to withdraw one's self is a kind of impotency.

Hereof Æsop framed the fable of the two frogs that consulted together in the time of drought (when many plashes that they had repaired to were dry) what was to be done; and the one propounded to go down into a deep well, because it was like the water would not fail there;" but the other answered, "Yea, but if it do fail, how shall we get up again?" And the reason is, that human actions are so uncertain and subject to perils, as that seemeth the best course which hath most passages out of it. Appertaining to this persuasion the forms are, you shall engage yourself; on the other side, "tantum, quantum voles, sumes ex fortuna;" i. e. take what lot you will; or, you shall keep the matter on your own hand. The reprehension of it is, that proceeding and resolving in all actions is necessary. For, as he saith well, not to resolve is to resolve, and many times it breeds as many necessities, and engageth as far in some other sort as to resolve. So it is but the covetous man's disease translated in power; for the covetous man will enjoy nothing, be-

cause he will have his full store and possibility to enjoy the more; so, by this reason, a man should execute nothing, because he should be still indifferent and at liberty to execute any thing. Besides necessity, and this same "*jacta est alea*," or once having cast the dice, hath many times an advantage, because it awaketh the powers of the mind and strengtheneth endeavour, "*ceteris pares, necessitate certe superiores istis*," (which are able to deal with any others, but master these upon necessity).

The following is the Eighth in both publications:—

That which a man hath procured by his own default is a greater mischief (or evil); that which is laid on him by others is a lesser evil.

The reason is, because the sting and remorse of the mind accusing itself doubleth all adversity; contrariwise, the considering and recording inwardly that a man is clear and free from fault, and just imputation doth temper outward calamities. For if the will be in the sense and in the conscience both, there is a germination of it; but if evil be in the one and comfort in the other, it is a kind of compensation. So the poets in tragedies do make the most passionate lamentation, and those that forerun final despair, to be accusing, questioning, and torturing of a man's self.

Seque unam clamat causamque caputque malorum :

She railing doth confess herself to be

The cause and source of her own misery.

And contrariwise the extremities of worthy persons have been annihilated in the consideration of their own good deserving. Besides, when the evil cometh from without, there is left a kind of evaporation of grief if it come by human injury, either by indignation and meditating of revenge from ourselves, or by expecting or fore-conceiving that Nemesis and retribution will take hold of the authors of our hurt; or if it be by fortune or accident, yet there is left a kind of expostulation against the divine powers:—

Atque Deos atque astra vocat crudelia mater :

The Gods and cruel stars the mother chargeth.

But where the evil is derived from a man's own fault, there all strikes deadly inwards and suffocateth.

The reprehension of this colour is:—

First, in respect of hope; for reformation of our fault is in

nostra potestate, our own power; but amendment of our fortune simply is not. Therefore Demosthenes in many of his orations saith thus to the people of Athens:—"That which having regard to the time past is the worse point and circumstance of all the rest; that as to the time to come is the best. What is that, even this, that by your sloth, irresolution, and misgovernment, yourj affairs are grown to this declination and decay. For had you used and ordered your means and forces to the best, and done your parts every way to the full, and, notwithstanding, your matters should have gone backward in this manner as they do, there had been no hope left of recovery or reputation. But since it hath been only by your own errors, &c." So Epictetus in his degrees saith, "The worst state of man is to excuse extern things, better than that to accuse any man's self, and best of all to accuse neither."

Another reprehension of this colour is in respect of the well-bearing of evils, wherewith a man can charge no body but himself, which maketh them the less:—

———— Leve fit, quod bene fertur onus :

That burden's light, that's on discreetly laid.

And therefore many natures that are either extremely proud and will take no fault to themselves, or else very true and cleaving to themselves (when they see the blame of anything that falls out ill must light upon themselves), have no other shift but to bear it out well, and to make the least of it; for, as we see, when sometimes a fault is committed, and before it be known who is to blame, much ado is made of it, but after, if it appear to be done by a son, or by a wife, or by a near friend, then it is light made of it: so much more when a man must take it upon himself. And therefore it is commonly seen that women which marry husbands of their own choosing, against their friends' consents, if they be never so ill-used yet you shall seldom see them complain, but set a good face on it.

In the *De Augmentis* Bacon adds, that he has a great number more of such Colours, which he had collected in his youth, but without their illustrations and *elenchi*, or refutations; which at the present time he has no leisure to draw up. He thinks it best, therefore, not to produce them in their unclothed condition.

The collection of Colours, or *Sophisms*, as they are called in the *De Augmentis*, is followed by a second col-

lection of what are called *Antitheta Rerum* (antithetical statements of things), which is described as pertaining to the promptuary part of Rhetoric. "Our meaning is," says Bacon (to quote Shaw's translation), "that all the places of common use, whether for proof, confutation, persuasion, dissuasion, praise, or dispraise, should be ready studied, and either exaggerated or degraded with the utmost effort of genius, or, as it were, perverse resolution, beyond all measure of truth. And the best way of forming this collection, both for conciseness and use, we judge to be that of contracting and winding up these places into certain acute and short sentences, as into so many clues, which may occasionally be wound off into larger discourses." "Brief and acute sentences," is Bacon's own description in the *Advancement*, "not to be cited, but to be as skeins or bottoms of thread, to be unwinded at large when they come to be used; supplying authorities and examples by reference."

There are forty-seven of these *Antitheta* in all. In the following specimens Shaw's translation is adopted:—

NOBILITY.

For.

Where virtue is deeply implanted from the stock, there can be no vice.

Nobility is a laurel conferred by time.

If we reverence antiquity in dead monuments; we should do it much more in living ones.

If we despise nobility in families, what difference is there betwixt men and brutes?

Nobility shelters virtue from envy, and recommends it to favour.

Against.

Nobility seldom springs from virtue; and virtue seldomer from nobility.

Nobles oftener plead their ancestors for pardon than promotion.

New rising men are so industrious, as to make nobles seem like statues.

Nobles, like bad racers, look back too often in the course.

SUPERSTITION.

For.

They who err out of zeal, though they are not to be approved, should yet be pitied.

Mediocrity belongs to morality, extremes to divinity.

A superstitious man is a religious formalist.

I should sooner believe all the fables and absurdities of any religion, than that the universal frame is without a deity.

Against.

As an ape appears the more deformed for his resemblance to man, so the similitude of superstition to religion makes it the more odious.

What affectation is in civil matters, such is superstition in divine.

It were better to have no belief of a God, than such an one as dishonours him.

It was not the school of Epicurus, but the Stoics, that disturbed the states of old.

The real atheists are hypocrites, who deal continually in holy things without feeling.

TEMPERANCE.

For.

To abstain and sustain are nearly the same virtue.

Uniformity, concords, and the measure of motions, are things celestial, and the characters of eternity.

Temperance, like wholesome cold, collects and strengthens the force of the mind.

When the senses are too exquisite and wandering, they want narcotics; so likewise do wandering affections.

Against.

I like not bare negative virtues, they argue innocence, not merit.

The mind languishes, that is not sometimes spirited up by excess.

I like the virtues, which produce the vivacity of action, not the dulness of passion,

The sayings, "Not to use, that you may not desire;" "Not to desire, that you may not fear," &c., proceed from pusillanimous and distrustful natures.

LEARNING.

For.

To write books upon minute particulars, were to render experience almost useless.

Reading is conversing with the wise; but acting is generally conversing with fools.

Sciences, of little significance in themselves, may sharpen the wit, and marshal the thoughts.

Against.

Men in universities are taught to believe.

What art ever taught the seasonable use of art?

To be wise by precept, and wise by experience, are contrary habits; the one sorts not with the other.

A vain use is made of art, lest it should otherwise be unemployed.

It is the way of scholars to show all they know; and oppose further information.

CEREMONIES.

For.

A graceful deportment is the true ornament of virtue.

If we follow the vulgar in the use of words, why not in habit and gesture?

He who observes not decorum in smaller matters, may be a great man, but is unwise at times.

Virtue and wisdom, without all respect and ceremony, are like foreign languages, unintelligible to the vulgar.

He who knows not the sense of the people, neither by congruity nor observation, is senseless.

Ceremonies are the translation of virtue into our own language.

Against.

What can be more disagreeable than in common life to copy the stage?

Ingenuous behaviour procures esteem; but affectation and cunning, hatred.

Better a painted face and curled hair, than a painted and curled behaviour.

He is incapable of great matters, who breaks his mind with trifling observations.

Affectation is the glossy corruption of ingenuity.

INNOVATION.

For.

Every remedy is an innovation.

He who will not apply new remedies, must expect new diseases.

Time is the greatest innovator ; and why may we not imitate time ?

Ancient precedents are unsuitable, and late ones corrupt and degenerate.

Let the ignorant square their actions by example.

As they who first derive honour to their family, are commonly more worthy than those who succeed them, so innovations generally excel imitations.

An obstinate adherence to customs is as turbulent a thing as innovation.

Since things of their own course change for the worse, if they are not by prudence altered for the better, what end can there be of the ill ?

The slaves of custom are the sport of time.

Against.

New births are deformed things.

No author is accepted till time has authorized him.

All novelty is injury, for it defaces the present state of things.

Things authorized by custom, if not excellent, are yet comfortable, and sort well together.

What innovator follows the example of time, which insinuates new things so quietly as to be almost imperceptible ?

Things that happen unexpected, are less agreeable to those they benefit, and more afflicting to those they injure.

“The examples of Antithets here laid down,” says Bacon, “may not perhaps deserve the place assigned them ; but, as they were collected in my youth, and are really seeds, not flowers, I was unwilling they should be lost. In this they plainly show a juvenile warmth ; that they abound in the moral and demonstrative kind, but touch sparingly upon the deliberative and judicial.” Many of the thoughts thus early stored up by him are inserted in the same, or nearly in the same, form in his *Essays* and other writings ; we may perceive how others, like seeds, as he calls them, had germinated in his mind. In the *Advancement* he compares the collection to “a

shop of pieces unmade up," and another collection of what he calls *Formulae* to "a shop of things ready made up." "*Formulae*," it is added, "are but decent and apt passages or conveyances of speech, which may serve indifferently for differing subjects; as of preface, conclusion, digression, transition, excusation, &c. For, as in buildings there is great pleasure and use in the well-casting of the staircases, entries, doors, windows, and the like; so in speech the conveyances and passages are of special ornament and effect." Only one example of a Formula is subjoined, under the title of *A conclusion in a deliberative*:—"So may we redeem the faults past, and prevent the inconveniences future." Two or three more examples are added in the Latin treatise.

Chapter Four is occupied with the consideration of two Appendices of the Traditive Art; the one Critical, the other Pedagogic or Pedantical. The Critical is concerned with the right editing, expounding, and judging of books; the Pedagogic with the right method of reading and studying books. In the *De Augmentis*, under the head of Pedagogic, we are told at setting out that the shortest precept that could be given would be, Consult the schools of the Jesuits; for nothing better hath ever come into use. A public and collegiate education of youth is also emphatically recommended, in preference to either a domestic one or one under private tutors. With regard to the manner and order of teaching, also, youth are especially warned to beware of compends, and of that precocity of learning, which begets only intellectual confidence, and produces rather the show than the substance of great proficiency. What follows may be given as it stands in the *Advancement*, from which the Latin is translated with little alteration:—

For pedantical knowledge, it containeth that difference of tradition which is proper for youth; whereunto appertain divers considerations of great fruit.

As first, the timing and seasoning of knowledges; as with what to initiate them, and from what for a time to refrain them.

Secondly, the consideration where to begin with the easiest, and so proceed to the more difficult ; and in what courses to press the more difficult, and then to turn them to the more easy : for it is one method to practise swimming with bladders, and another to practise dancing with heavy shoes.

A third is, the application of learning according unto the propriety of the wits ; for there is no defect in the faculties intellectual but seemeth to have a proper cure contained in some studies ; as for example, if a child be bird-witted, that is, hath not the faculty of attention, the mathematics giveth a remedy thereunto ; for in them, if the wit be caught away but a moment, one is to begin anew. And as sciences have a propriety towards faculties for cure and help, so faculties or powers have a sympathy towards sciences for excellency or speedy profiting ; and therefore it is an inquiry of great wisdom, what kinds of wits and natures are most proper for what sciences.

Fourthly, the ordering of exercises is matter of great consequence to hurt or help : for, as is well observed by Cicero, men in exercising their faculties, if they be not well advised, do exercise their faults and get ill habits as well as good ; so there is a great judgment to be had in the continuance and intermission of exercises. It were too long to particularize a number of other considerations of this nature, things but of mean appearance, but of singular efficacy. For as the wronging or cherishing of seeds or young plants is that that is most important to their thriving (and as it was noted that the first six kings being in truth as tutors of the state of Rome in the infancy thereof, was the principal cause of the immense greatness of that state which followed), so the culture and manurance of minds in youth hath such a forcible, though unseen operation, as hardly any length of time or contention of labour can countervail it afterwards. And it is not amiss to observe also how small and mean faculties gotten by education, yet, when they fall into great men or great matters, do work great and important effects ; whereof we see a notable example in Tacitus of two stage-players, Percennius and Vibulenus, who by their faculty of playing put the Pannonian armies into an extreme tumult and combustion : for, there arising a mutiny amongst them upon the death of Augustus Cæsar, Blæsus the lieutenant had committed some of the mutineers, which were suddenly rescued ; whereupon Vibulenus got to be heard speak, which he did in this manner :—"These poor innocent wretches, appointed to cruel death, you have restored to behold

the light ; but who shall restore my brother to me, or life unto my brother, that was sent hither in message from the legions of Germany, to treat of the common cause ? and he hath murdered him this last night by some of his fencers and ruffians, that he hath about him for his executioners upon soldiers. Answer, Blæsus, what is done with his body ? The mortalest enemies do not deny burial. When I have performed my last duties to the corpse with kisses, with tears, command me to be slain beside him ; so that these my fellows for our good meaning and our true hearts to the legions, may have leave to bury us." With which speech he put the army into an infinite fury and uproar : whereas truth was he had no brother, neither was there any such matter ; but he played it merely as if he had been upon the stage.

With these first six Books finishes the portion of the *De Augmentis* relating to the logical sciences, or to what is properly to be called the Baconian system of philosophy. For the remainder of the work a more summary account will suffice.

The Seventh Book is nearly the same in the Latin as in the original English. It consists of three Chapters ; and takes a survey of Ethics as divided into the doctrine touching the Exemplar or Platform (that is, the essential nature) of the Good, and the doctrine of the Cultivation and Practice of the Good, called by Bacon, after his manner, the Georgics of the Mind. The Good, in its general nature, is divided into Good Simple and Good Compared ; or the Good in its Kinds and in its Degrees. Good Simple, again, is either Private and Particular, or of Communion. Individual Good is divided into Active and Passive Good ; and Passive Good is further subdivided into Conservative and Perfective. Good of Communion, or that which has a reference to others, regards either common duties, or duties respective or special. The doctrine of the Practice of the Good is made to include the doctrines of the General Dispositions or Characteristic Qualities of Minds ; of their Affections and Passions ; and of the Remedies suited for all mental defects and errors. Finally, as an Appendix to this last

doctrine comes that of the agreement between Good of the Mind and Good of the Body.

We subjoin one or two of the more remarkable passages as they stand in the *Advancement* :—

To resume the good of conservation or comfort, which consisteth in the fruition of that which is agreeable to our natures; it seemeth to be the most pure and natural of pleasures, but yet the softest and the lowest. And this also receiveth a difference, which hath neither been well judged of, nor well inquired: for the good of fruition or contentment is placed either in the sincereness of the fruition, or in the quickness and vigour of it: the one superinduced by the equality, the other by vicissitude; the one having less mixture of evil, the other more impression of good. Whether of these is the greater good, is a question controverted; but whether man's nature may not be capable of both, is a question not inquired.

The former question being debated between Socrates and a sophist, Socrates placing felicity in an equal and constant peace of mind, and the sophist in much desiring and much enjoying, they fell from argument to ill words: the sophist saying that Socrates's felicity was the felicity of a block or stone; and Socrates saying that the sophist's felicity was the felicity of one that had the itch, who did nothing but itch and scratch. And both these opinions do not want their supports: for the opinion of Socrates is much upheld by the general consent even of the Epicures themselves, that virtue beareth a great part in felicity; and if so, certain it is, that virtue hath more use in clearing perturbations than in compassing desires. The sophist's opinion is much favoured by the assertion we last spake of, that good of advancement is greater than good of simple preservation; because every obtaining a desire hath a show of advancement, as motion, though in a circle, hath a show of progression.

But the second question, decided the true way, maketh the former superfluous. For can it be doubted, but that there are some who take more pleasure in enjoying pleasures than some other, and yet nevertheless are less troubled with the loss or leaving of them? so as this same, "Non uti ut non appetas, non appetere ut non metuas, sunt animi pusilli et diffidentis."*

* Not to use without desire, not to desire without fear, are the marks of a weak and distrusting mind.

And it seemeth to me, that most of the doctrines of the philosophers are more fearful and cautionary than the nature of things requireth. So have they increased the fear of death in offering to cure it: for when they would have a man's whole life to be but a discipline or preparation to die, they must needs make men think that it is a terrible enemy, against whom there is no end of preparing. Better, saith the poet:

Qui finem vitæ extremum inter munera ponat
Naturæ.*

So have they sought to make men's minds too uniform and harmonical, by not breaking them sufficiently to contrary motions: the reason whereof I suppose to be, because they themselves were men dedicated to a private, free, and unapplied course of life. For as we see, upon the lute or like instrument, a ground, though it be sweet and have show of many changes, yet breaketh not the hand to such strange and hard stops and passages, as a set song or voluntary; much after the same manner was the diversity between a philosophical and a civil life. And therefore men are to imitate the wisdom of jewellers; who, if there be a grain, or a cloud, or an ice which may be ground forth without taking too much of the stone, they help it; but if it should lessen and abate the stone too much, they will not meddle with it: so ought men so to procure serenity as they destroy not magnanimity.

The following is from the latter part of the Book:—

The opinion of Aristotle seemeth to me a negligent opinion, that of those things which consist by nature, nothing can be changed by custom; using for example, that if a stone be thrown ten thousand times up, it will not learn to ascend; and that by often seeing or hearing, we do not learn to see or hear the better. For though this principle be true in things wherein nature is peremptory, (the reason whereof we cannot now stand to discuss,) yet it is otherwise in things wherein nature admitteth a latitude. For he might see that a strait glove will come more easily on with use; and that a wand will by use bend otherwise than it grew; and that by use of the voice we speak louder and stronger; and that by use of enduring heat or cold, we endure it the better, and the like:

* Who looks on death as Nature's latest gift.

which latter sort have a nearer resemblance unto that subject of manners he handleth, than those instances which he allegeth. But allowing his conclusion, that virtues and vices consist in habit, he ought so much the more to have taught the manner of superinducing that habit: for there be many precepts of the wise ordering the exercises of the mind, as there is of ordering the exercises of the body; whereof we will recite a few.

The first shall be, that we beware we take not at the first either too high a strain, or too weak. For if too high, in a diffident nature you discourage; in a confident nature you breed an opinion of facility, and so a sloth; and in all natures you breed a further expectation than can hold out, and so an insatisfaction on the end. If too weak, of the other side, you may not look to perform and overcome any great task.

Another precept is, to practise all things chiefly at two several times, the one when the mind is best disposed, the other when it is worst disposed; that by the one you may give a great step, by the other you may work out the knots and stonds of the mind, and make the middle times the more easy and pleasant.

Another precept is, that which Aristotle mentioneth by the way, which is to bear ever towards the contrary extreme of that whereunto we are by nature inclined; like unto the rowing against the stream, or making a wand straight by bending him contrary to his natural crookedness.

Another precept is, that the mind is brought to anything better, and with more sweetness and happiness, if that whereunto you pretend be not first in the intention, but "*tanquam aliud agendo*,"* because of the natural hatred of the mind against necessity and constraint. Many other axioms there are touching the managing of exercise and custom; which being so conducted, doth prove indeed another nature; but being governed by chance, doth commonly prove but an ape of nature, and bringeth forth that which is lame and counterfeit.

Wherefore we will conclude with that last point, which is of all other means the most compendious and summary, and again, the most noble and effectual to the reducing of the mind unto virtue and good estate; which is the electing and propounding unto a man's self good and virtuous ends of his life,

* As if intent on business with which we had no concern.

such as may be in a reasonable sort within his compass to attain. For if these two things be supposed, that a man set before him honest and good ends, and again, that he be resolute, constant, and true unto them; it will follow that he shall mould himself into all virtue at once. And this indeed is like the works of nature, whereas the other course is like the work of the hand. For as when a carver makes an image, he shapes only that part whereupon he worketh (as if he be upon the face, that part which shall be the body is but a rude stone still, till such time as he comes to it); but, contrariwise, when nature makes a flower or living creature, she formeth rudiments of all the parts at one time: so in obtaining virtue by habit, while a man practiseth temperance, he doth not profit much to fortitude nor the like; but when he dedicateth and applieth himself to good ends, look, what virtue soever the pursuit and passage towards those ends doth commend unto him, he is invested of a precedent disposition to conform himself thereunto. Which state of mind Aristotle doth excellently express himself, that it ought not to be called virtuous, but divine: his words are these—*“Immanitati autem consentaneum est opponere eam, quæ supra humanitatem est, heroicam sive divinam virtutem;”** and a little after, *“Nam ut feræ neque vitium neque virtus est, sic neque Dei: sed hic quidem status altius quiddam virtute est, ille aliud quiddam a vitio.”*† And therefore we may see what celsitude of honour Plinius Secundus attributeth to Trajan in his funeral oration, where he said, “That men needed to make no other prayers to the gods, but that they would continue as good lords to them as Trajan had been;” as if he had not been only an imitation of divine nature, but a pattern of it. But these be heathen and profane passages, having but a shadow of that divine state of mind which religion and the holy faith do conduct men unto by imprinting upon their souls charity, which is excellently called the bond of perfection, because it comprehendeth and fasteneth all virtues together. And as it is elegantly said by Menander of vain love, which is but

* It is the characteristic of a ferocious disposition to oppose that heroic or rather divine virtue which transcends humanity.

† As beasts cannot be said to have vice or virtue, so neither can the gods; for as the condition of the latter is something more exalted than virtue, so that of the former is something different from vice.

a false imitation of divine love—"Amor melior sophista lævo ad humanam vitam,"* that love teacheth a man to carry himself better than the sophist or preceptor, which he calleth left-handed, because, with all his rules and precepts, he cannot form a man so dexterously, nor with that facility to prize himself and govern himself as love can do; so certainly, if a man's mind be truly inflamed with charity, it doth work him suddenly into greater perfection than all the doctrine of morality can do, which is but a sophist in comparison of the other. Nay further, as Xenophon observed truly, that all other affections, though they raise the mind, yet they do it by distorting and uncomeliness of extacies or excesses; but only love doth exalt the mind, and nevertheless at the same instant doth settle and compose it: so in all other excellencies, though they advance nature, yet they are subject to excess; only charity admitteth no excess. For so we see, by aspiring to be like God in power, the angels transgressed and fell—"Ascendam, et ero similis altissimo:"† by aspiring to be like God in knowledge, man transgressed and fell—"Eritis sicut Dii, scientes bonum et malum:"‡ but by aspiring to a similitude of God in goodness or love, neither man nor angel ever transgressed, or shall transgress. For unto that imitation we are called—"Diligite inimicos vestros, benefacite eis qui oderunt vos, et orate pro persequentibus et calumniantibus vos, ut sitis filii Patris vestri qui in cœlis est, qui solem suum oriri facit super bonos et malos, et pluit super justos et injustos."§ So in the first platform of the divine nature itself, the heathen religion speaketh thus, "Optimus Maximus;"|| and the sacred Scriptures thus, "Misericordia ejus super omnia opera ejus."¶

Wherefore I do conclude this part of moral knowledge, concerning the culture and regimen of the mind; wherein if any man, considering the parts thereof which I have enumerated,

* Love is better than any tutor as a guide to human life.

† I will mount and be like unto the Most High.

‡ Ye shall be like gods, knowing good and evil.

§ Love your enemies, do good to them who hate you, and pray for them who despitefully use you and persecute you, that you may be the children of your Father in heaven, who maketh his sun to rise upon the evil and the good, and sendeth his rain upon the just and upon the unjust.

|| Best and greatest.

¶ His tender mercy is over all his works.

do judge that my labour is but to collect into an art or science that which hath been pretermitted by others, as matters of common sense and experience, he judgeth well. But as Philocrates sported with Demosthenes—"You may not marvel, Athenians, that Demosthenes and I do differ; for he drinketh water, and I drink wine," and like as we read of an ancient parable of the two gates of sleep—

Sunt geminæ somni portæ; quarum altera fertur
Cornea, qua veris facilis datur exitus umbris;
Altera candenti perfecta nitens elephanto,
Sed falsa ad cælum mittunt insomnia manes:”*

so if we put on sobriety and attention, we shall find it a sure maxim in knowledge, that the more pleasant liquor of wine is the more vaporous, and the braver gate of ivory sendeth forth the falsest dreams.

The subject of the Eighth Book is Civil Knowledge, or the Ethics of Statesmanship; “a subject,” says Bacon, “which of all others (we must understand him to mean, in ethical science) is most immersed in matter, and hardiest reduced to axiom.” The Book is about three times the length of the corresponding portion of the *Advancement*; and it is much the longest of the nine Books of the *De Augmentis*. It is divided into three Chapters; the principal additions consisting of illustrative examples inserted in the second and third. Civil Knowledge is distributed into the doctrine of Conversation, the doctrine of Negotiation or Business, and the doctrine of Government; the First Chapter contains a few observations on the first; the two remaining Chapters are devoted respectively to the second and third.

The passage on Conversation in the *Advancement* is as follows; it is slightly extended in the Latin:—

The wisdom of conversation ought not to be overmuch affected, but much less despised; for it hath not only an honour

* Thus rendered by Dryden:—

Two gates the silent house of sleep adorn;
Of polished ivory this, that of transparent horn;
True visions through transparent horn arise,
Through polished ivory pass deluding lies.

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in itself, but an influence also into business and government. The poet saith—

Nec vultu destrue verba tuo :*

a man may destroy the force of his words with his countenance : so may he of his deeds, saith Cicero, recommending to his brother affability and easy access—"Nil interest habere ostium apertum, vultum clausum ;"† it is nothing won to admit men with an open door, and to receive them with a shut and reserved countenance. So, we see, Atticus, before the first interview between Cæsar and Cicero, the war depending, did seriously advise Cicero touching the composing and ordering of his countenance and gesture. And if the government of the countenance be of such effect, much more is that of the speech, and other carriage appertaining to conversation ; the true model whereof seemeth to me well expressed by Livy, though not meant for this purpose—"Ne aut arrogans videar, aut obnoxius ; quorum alterum est alienæ libertatis oblitus, alterum suæ :"[†] the sum of behaviour is to retain a man's own dignity, without intruding upon the liberty of others. On the other side, if behaviour and outward carriage be intended too much, first it may pass into affectation, and then "quid deformius quam scenam in vitam transferre"[§] to act a man's life ? But although it proceed not to that extreme, yet it consumeth time, and employeth the mind too much. And therefore as we use to advise young students from company keeping, by saying, "Amici fures temporis,"|| so certainly the intending of the discretion of behaviour is a great thief of meditation. Again, such as are accomplished in that form of urbanity please themselves in it, and seldom aspire to higher virtue ; whereas those that have defect in it do seek comeliness by reputation ; for where reputation is, almost everything becometh ; but where that is not, it must be supplied by puntos and compliments. Again, there is no greater impediment of action than an over-

* Let not harsh looks your soothing words belie.

† It is not enough to keep your door open, if your looks forbid entrance.

‡ Lest I should seem arrogant or subservient ; the former of which argues forgetfulness of the freedom of others, the latter of our own.

§ What is worse than to transfer the stage to real life ?

|| Friends are thieves of time.

curious observance of decency, and the guide of decency, which is time and season. For as Solomon saith, "Qui respicit ad ventos, non seminat; et qui respicit ad nubes, non metit:"* a man must make his opportunity, as oft as find it. To conclude; behaviour seemeth to me as a garment of the mind, and to have the conditions of a garment. For it ought to be made in fashion; it ought not to be too curious; it ought to be shaped so as to set forth any good making of the mind, and hide any deformity; and above all, it ought not to be too strait or restrained for exercise or motion.

The following short paragraph from the beginning of the Second Chapter is nearly the same in both treatises:—

The wisdom touching Negotiation or Business hath not been hitherto collected into writing, to the great derogation of learning, and the professors of learning. For from this root springeth chiefly that note or opinion, which by us is expressed in adage to this effect—"that there is no great concurrence between learning and wisdom." For of the three wisdoms which we have set down to pertain to civil life, for wisdom of behaviour, it is by learned men for the most part despised, as an inferior to virtue, and an enemy to meditation; for wisdom of government, they acquit themselves well when they are called to it, but that happeneth to few; but for the wisdom of business, wherein man's life is most conversant, there be no books of it, except some few scattered advertisements, that have no proportion to the magnitude of this subject. For if books were written of this, as the other, I doubt not but learned men with mean experience, would far excel men of long experience without learning, and outshoot them in their own bow.

After this we have a collection of aphorisms gathered from the Parables (or Proverbs) of Solomon, accompanied with short explanations or commentaries, by way of examples of what is called the Doctrine or Knowledge of Scattered Occasions (*Doctrina de Sparsis Occasionibus*), which is made the First Part of the Doctrine of Business; the Knowledge of Rising in the World (*Am-*

* He that observeth the wind shall not sow; and he that regardeth the clouds shall not reap.

bitus Vitae) being the Second. The number of these aphorisms, which was twenty-four in the *Advancement of Learning*, is increased to thirty-four in the *De Augmentis*; two, besides, are omitted, so that the number of the new aphorisms is twelve; and the explanations, which are in general strikingly ingenious, are also for the most part much extended. Adopting Shaw's English (though not very good), we will give first a few of those to be found, though in a shorter form, in the *Advancement* :—

A soft answer turneth away wrath.—If the anger of a prince, or superior, be kindled against you; and it be now your turn to speak; Solomon directs; 1. that an answer be made; and 2. that it be soft. The first rule contains three precepts; viz. 1. to guard against a melancholy and stubborn silence; for this either turns the fault wholly upon you, as if you could make no answer; or secretly impeaches your superior, as if his ears were not open to a just defence. 2. To beware of delaying the thing; and requiring a longer day for your defence: which either accuses your superior of passion; or signifies that you are preparing some artificial turn or colour. So that it is always best directly to say something for the present, in your own excuse, as the occasion requires. And 3. to make a real answer; an answer not a mere confession or bare submission; but a mixture of apology and excuse. For it is unsafe to do otherwise; unless with very generous and noble spirits, which are extremely rare. Then follows the second rule: that the answer be mild and soft, not stiff and irritating.

A wise man contending with a fool, whether he gets angry or smiles, will not find rest.—We are frequently admonished to avoid unequal conflicts, that is, not to strive with the stronger. But the admonition of Solomon is no less useful; that we should not strive with the worthless, for here the match is very unequal; where it is no victory to conquer, and a great disgrace to be conquered. Nor does it signify if, in such a contest, we should sometimes deal as in jest; and sometimes in the way of disdain and contempt. For what course soever we take, we are losers, and can never come handsomely off. But the worst case of all is, if our antagonist have something of the fool in him; that is, if he be confident and headstrong.

The end of a speech is better than the beginning.—This

aphorism corrects a common error, prevailing not only among such as principally study words, but also the more prudent; viz., that men are more solicitous about the beginnings and entrances of their discourses, than about the conclusions; and more exactly labour their prefaces and introductions than their closes. Whereas they ought not to neglect the former; but should have the latter, as being things of far greater consequence, ready prepared beforehand: casting about with themselves, as much as possible, what may be the last issue of the discourse; and how business may be thence forwarded and ripened. They ought further, not only to consider the windings up of discourses relating to business; but to regard also such turns as may be advantageously and gracefully given upon departure; even though they should be quite foreign to the matter in hand. It was the constant practice of two great and prudent privy-counsellors, on whom the weight of the kingdom chiefly rested, as often as they discoursed with their princes upon matters of state, never to end the conversation with what regarded the principal subject; but always to go off with a jest, or some pleasant device; and, as the proverb runs, "Washing off their salt-water discourses with fresh, at the conclusion." And this was one of the principal arts they had.

Have you seen a man quick at his work? He shall stand before kings, and shall not be neglected.—Of all the virtues which kings chiefly regard and require, in the choice of servants, that of expedition and resolution, in the dispatch of business, is the most acceptable. Men of depth are held suspected by princes; as inspecting them too close; and being able, by their strength of capacity, as by a machine, to turn and wind them against their will, and without their knowledge. Popular men are hated; as standing in the light of kings; and drawing the eyes of the multitude upon themselves. Men of courage are generally esteemed turbulent, and too enterprising. Honest and just men are accounted morose: and not pliable enough to the will of their masters. Lastly, there is no virtue but has its shade, wherewith the minds of men are offended; but dispatch alone in executing their commands has nothing displeasing to them. Besides, the motions of the minds of kings are swift, and impatient of delay: for they think themselves able to effect anything, and imagine that nothing more is wanting but to have it done instantly. Whence dispatch is to them the most grateful of all things.

The following are from those added in the *De Augmentis* :—

As dead flies cause the best ointment to send forth an ill odour, so doth a little folly him that is in reputation for wisdom and honour.—The condition of men eminent for virtue is, as this aphorism excellently observes, exceeding hard and miserable; because their errors, though ever so small, are not overlooked. But, as in a clear diamond every little grain, or speck, strikes the eye disagreeably, though it would scarce be observed in a duller stone; so in men of eminent virtue, their smallest vices are readily spied, talked of, and severely censured; whilst in an ordinary man, they would either have lain concealed, or been easily excused. Whence a little folly in a very wise man; a small slip in a very good man; and a little indecency in a polite and elegant man; greatly diminish their characters and reputations. It might, therefore, be no bad policy, for men of uncommon excellencies, to intermix with their actions a few absurdities, that may be committed without vice; in order to reserve a liberty, and confound the observation of little defects.

A prudent man looks well to his steps; but a fool turns aside to deceit.—There are two kinds of prudence; the one true and sound; the other degenerate and false: the latter Solomon calls by the name of folly. The candidate for the former has an eye to his footings, looking out for dangers, contriving remedies, and by the assistance of good men, defending himself against the bad: he is wary in entering upon business, and not unprovided of a retreat; watchful for opportunities; powerful against opposition, &c. But the follower of the other is wholly patched up of fallacy and cunning; placing all his hope in the circumventing of others, and forming them to his fancy. And this the aphorism justly rejects as a vicious, and even a weak kind of prudence. For 1. it is by no means a thing in our own power; nor depending upon any constant rule: but is daily inventing of new stratagems, as the old ones fail and grow useless. 2. He who has once the character of a crafty, tricking man, is entirely deprived of a principal instrument of business, trust: whence he will find nothing succeed to his wish. 3. Lastly, however specious and pleasing these arts may seem, yet they are often frustrated; as well observed by Tacitus, when he said, that crafty and bold counsels, though pleasant in the expectation, are hard to execute, and unhappy in the event.

He has stayed the longer, Bacon adds, upon these politic sentences of Solomon, from his desire to give authority to this part of knowledge by so excellent a precedent ; and then he proceeds :—

Neither was this in use only with the Hebrews, but it is generally to be found in the wisdom of the more ancient times ; that as men found out any observation that they thought was good for life, they would gather it, and express it in parable, or aphorism, or fable. But for fables, they were vicegerents and supplies where examples failed : now that the times abound with history, the aim is better when the mark is alive. And therefore the form of writing which of all others is fittest for this variable argument of negotiation and occasion is that which Machiavel chose wisely and aptly for government ; namely, discourse upon histories or examples : for knowledge drawn freshly, and in our view, out of particulars knoweth the way best to particulars again ; and it hath much greater life for practice when the discourse attendeth upon the example, than when the example attendeth upon the discourse. For this is no point of order, as it seemeth at first, but of substance : for when the example is the ground, being set down in a history at large, it is set down with all circumstances, which may sometimes control the discourse thereupon made, and sometimes supply it as a very pattern for action ; whereas the examples alleged for the discourse's sake are cited succinctly, and without particularity, and carry a servile aspect toward the discourse which they are brought in to make good.

But this difference is not amiss to be remembered, that as history of times is the best ground for discourse of government, such as Machiavel handleth, so history of lives is the most proper for discourse of business, because it is most conversant in private actions. Nay, there is a ground of discourse for this purpose fitter than them both, which is discourse upon letters such as are wise and weighty, as many are of Cicero ad Atticum, and others. For letters have a great and more particular representation of business than either chronicles or lives.

The arrangement of the remaining portion of the Chapter is somewhat changed in the *De Augmentis* ; but the additions are not very considerable. The following paragraphs are nearly the same in the Latin as in the English :—

But the covering of defects is of no less importance than the valuing of good parts; which may be done likewise in three manners, by caution, by colour, and by confidence. Caution is when men do ingeniously and discreetly avoid to be put into those things for which they are not proper: whereas, contrariwise, bold and unquiet spirits will thrust themselves into matters without difference, and so publish and proclaim all their wants: colour is, when men make a way for themselves, to have a construction made of their faults or wants, as proceeding from a better cause, or intended for some other purpose: for of the one it is well said, "*Sæpe latet vitium proximitate boni*,"* and therefore, whatsoever want a man hath, he must see that he pretend the virtue that shadoweth it; as, if he be dull, he must affect gravity; if a coward, mildness; and so the rest: for the second, a man must frame some probable cause why he should not do his best, and why he should dissemble his abilities; and for that purpose must use to dissemble those abilities which are notorious in him, to give colour that his true wants are but industries and dissimulations. For confidence, it is the last but surest remedy; namely, to depress and seem to despise whatsoever a man cannot attain; observing the good principle of the merchants, who endeavour to raise the price of their own commodities, and to beat down the price of others. But there is a confidence that passeth this other; which is, to face out a man's own defects, in seeming to conceive that he is best in those things wherein he is failing: and, to help that again, to seem on the other side that he hath least opinion of himself in those things wherein he is best: like as we shall see it commonly in poets, that if they show their verses, and you except to any, they will say that that line cost them more labour than any of the rest; and presently will seem to disable and suspect rather some other line, which they know well enough to be the best in the number. But above all, in this righting and helping of a man's self in his own carriage, he must take heed he show not himself dismantled, and exposed to scorn and injury, by too much dulceness, goodness, and facility of nature; but show some sparkles of liberty, spirit, and edge: which kind of fortified carriage, with a ready rescuing of a man's self from scorns, is sometimes of necessity imposed upon men by somewhat in their person or fortune; but it ever succeedeth with good felicity.

* Vice often lurks close to virtue.

Although depth of secrecy and making way, "*qualis est via navis in mari*,"* (which the French calleth "*sourdes menées*," when men set things in work without opening themselves at all;) be sometimes both prosperous and admirable; yet many times "*Dissimulatio errores parit, qui dissimulatorem ipsum illaqueant*;"† and, therefore, we see the greatest politicians have in a natural and free manner professed their desires, rather than been reserved and disguised in them: for so we see that Lucius Sylla made a kind of profession "that he wished all men happy or unhappy as they stood his friends or enemies." So Cæsar, when he went first into Gaul, made no scruple to profess "that he had rather be first in a village than second at Rome." So again, as soon as he had begun the war, we see what Cicero saith of him, "*Alter (meaning of Cæsar) non recusat, sed quodammodo postulat, ut, ut est, sic appelletur tyrannus*."‡ So we may see, in a letter of Cicero to Atticus, that Augustus Cæsar, in his very entrance into affairs, when he was a darling of the senate, yet in his harangues to the people would swear, "*Ita parentis honores consequi liceat*,"§ which was no less than the tyranny; save that, to help it, he would stretch forth his hand towards a statue of Cæsar's that was erected in the same place: and men laughed, and wondered, and said, "Is it possible?" or, "Did you ever hear the like?" and yet thought he meant no hurt; he did it so handsomely and ingeniously. And all these were prosperous: whereas Pompey, who tended to the same ends, but in a more dark and dissembling manner, as Tacitus saith of him, "*Ocultior, non melior*,"|| wherein Sallust concurrereth, "*ore probo, animo inverecondo*,"¶ made it his design, by infinite secret engines, to cast the state into an absolute anarchy and confusion, that the state might cast itself into his arms for necessity and protection, and so the sovereign power he put upon him, and he never seen in it: and when he had brought it, as he thought, to that point, when he was chosen consul alone, as

* Like the way of a ship in the sea.

† Deceit begets errors which entrap the deceiver.

‡ The other does not refuse, but rather demands to be called the tyrant that he is.

§ So may I obtain the honours of my illustrious relative.

|| More cautious, but not better.

¶ With probity on his lips and depravity in his soul.

never any was, yet he could make no great matter of it, because men understood him not; but was fain, in the end, to go the beaten track of getting arms into his hands, by colour of the doubt of Cæsar's designs. So tedious, casual, and unfortunate are these deep dissimulations: whereof, it seemeth, Tacitus made this judgment, that they were a cunning of an inferior form in regard of true policy; attributing the one to Augustus, the other to Tiberius; where, speaking of Livia, he saith, "*Et cum artibus mariti simulatione filii bene composita* :*" for surely the continual habit of dissimulation is but a weak and sluggish cunning, and not greatly politic. . . .

But men, if they be in their own power, and do bear and sustain themselves, and be not carried away with a whirlwind or tempest of ambition, ought, in the pursuit of their own fortune, to set before their eyes not only that general map of the world, that "all things are vanity and vexation of spirit," but many other more particular cards and directions: chiefly that, that being, without well-being, is a curse, and the greater being the greater curse; and that all virtue is most rewarded, and all wickedness most punished in itself: according as the poet saith excellently:

Quæ vobis, quæ digna, viri, pro laudibus istis
Præmia posse rear solvi? pulcherrima primum
Divi moresque dabunt vestri.†

And so of the contrary. And, secondly, they ought to look up to the eternal providence and divine judgment, which often subverteth the wisdom of evil plots and imaginations, according to the Scripture, "He hath conceived mischief, and shall bring forth a vain thing." And although men should refrain themselves from injury and evil arts, yet this incessant and sabbathless pursuit of a man's fortune leaveth not that tribute which we owe to God of our time; who we see demandeth a tenth of our substance, and a seventh, which is more strict, of our time: and it is to small purpose to have an erected face towards heaven, and a perpetual grovelling spirit upon earth,

* Compounded with the cleverness of her husband and the cunning of her son.

† Your lavish praise and kindness, O my friends!
All power of worthy payment far transcends;
But, while such noble sentiments you guard,
God and your conscience give you best reward.

eating dust, as doth the serpent, "Atque affigit humo divinæ particulam auræ."* And if any man flatter himself that he will employ his fortune well, though he should obtain it ill, as was said concerning Augustus Cæsar, and after of Septimius Severus, "that they should never have been born, or else they should never have died," they did so much mischief in the pursuit and ascent of their greatness, and so much good when they were established; yet these compensations and satisfactions are good to be used, but never good to be purposed. And lastly, it is not amiss for men, in their race toward their fortune, to cool themselves a little with that conceit which is elegantly expressed by the emperor Charles the Fifth, in his instructions to the king his son, "That fortune hath somewhat of the nature of a woman, that if she be too much wooed she is the farther off." But this last is but a remedy for those whose tastes are corrupted: let men rather build upon that foundation which is as a corner-stone of divinity and philosophy, wherein they join close, namely, that same "Primum quærite."† For Divinity saith, "Primum quærite regnum Dei, et ista omnia adjicientur vobis:"‡ and philosophy saith, "Primum quærite bona animi, cætera aut aderunt, aut non oberunt."§ And although the human foundation hath somewhat of the sands, as we see in M. Brutus, when he brake forth into that speech,—

Te colui, virtus, ut rem; at tu nomen inane es;||

yet the divine foundation is upon the rock.

What is said upon the doctrine of Government and Legislation in the *Advancement* is very short; and the Third Chapter of this Eighth Book of the *De Augmentis* is nearly all new. In the earlier treatise Bacon writes:—

Concerning Government, it is a part of knowledge secret

* And with its fetters binds to earth
The sacred spark of heavenly birth.

† Seek first.

‡ Seek ye first the kingdom of God, and all these things shall be added unto you.

§ Seek first the advantages of the mind, other things will either not be wanting or will not oppose you.

|| I deemed thee, Virtue, a substantial form,
And now I find thee but an empty name

and retired, in both those respects in which things are deemed secret; for some things are secret because they are hard to know, and some because they are not fit to utter. We see all governments are obscure and invisible :

Totamque infusa per artus
Mens agitat molem, et magno se corpore miscet.*

Such is the description of governments. We see the government of God over the world is hidden, insomuch as it seemeth to participate of much irregularity and confusion : the government of the soul in moving the body is inward and profound, and the passages thereof hardly to be reduced to demonstration. Again, the wisdom of antiquity, the shadows whereof are in the poets, in the description of torments and pains, next unto the crime of rebellion, which was the giants' offence, doth detest the crime of futility, as in Sisyphus and Tantalus. But this was meant of particulars ; nevertheless even unto the general rules and discourses of policy and government there is due a reverent and reserved handling.

But contrariwise, in the governors towards the governed, all things ought, as far as the frailty of man permitteth, to be manifest and revealed. For so it is expressed in the Scriptures touching the government of God, that this globe, which seemeth to us a dark and shady body, is in the view of God as crystal : "Et in conspectu sedis tanquam mare vitreum simile crystallo."† So unto princes and states, especially towards wise senates and councils, the natures and dispositions of the people, their conditions and necessities, their factions and combinations, their animosities and discontents, ought to be, in regard of the variety of their intelligences, the wisdom of their observations, and the height of their station where they keep sentinel, in great part clear and transparent. Wherefore, considering that I write to a king that is a master of this science, and is so well assisted, I think it decent to pass over this part in silence, as willing to obtain the certificate which one of the ancient philosophers aspired unto ; who, being silent, when others contended to make demonstration of their abilities by speech, desired it might be certified for his part, "that there was one that knew how to hold his peace."

* Throughout the universe, one common soul
Inspires, and feeds, and animates the whole.

† And in sight of the throne a sea of glass like unto crystal.

Notwithstanding, for the more public part of government, which is Laws, I think good to note only one deficiency; which is, that all those which have written of laws have written either as philosophers or as lawyers, and none as statesmen. As for the philosophers, they make imaginary laws for imaginary commonwealths; and their discourses are as the stars, which give little light, because they are so high. For the lawyers, they write according to the states where they live, what is received law, and not what ought to be law: for the wisdom of a lawmaker is one, and of a lawyer is another. For there are in nature certain fountains of justice, whence all civil laws are derived but as streams: and like as waters do take tinctures and tastes from the soils through which they run, so do civil laws vary according to the regions and governments where they are planted, though they proceed from the same fountains. Again, the wisdom of a lawmaker consisteth not only in a platform of justice, but in the application thereof; taking into consideration by what means laws may be made certain, and what are the causes and remedies of the doubtfulness and uncertainty of law; by what means laws may be made apt and easy to be executed, and what are the impediments and remedies in the execution of laws; what influence laws touching private right of meum and tuum have into the public state, and how they may be made apt and agreeable; how laws are to be penned and delivered, whether in texts or in acts, brief or large, with preambles or without; how they are to be pruned and reformed from time to time, and what is the best means to keep them from being too vast in volumes, or too full of multiplicity and crossness: how they are to be expounded, when upon causes emergent and judicially discussed, and when upon responses and conferences touching general points or questions; how they are to be pressed, rigorously or tenderly; how they are to be mitigated by equity and good conscience, and whether discretion and strict law are to be mingled in the same courts, or kept apart in several courts; again, how the practice, profession, and erudition of law is to be censured and governed; and many other points touching the administration, and, as I may term it, animation of laws. Upon which I insist the less, because I purpose, if God give me leave, having begun a work of this nature in aphorisms, to propound it hereafter, noting it in the mean time for deficient.

In the *De Augmentis* he begins (as the passage is translated by Wats);—"I come now to the Art

of Empire, or the Knowledge of Civil Government; and in which Household Government is comprehended, as a family is under a city. In this part, as I said before, I have commanded myself silence: yet, notwithstanding, I may not so disable myself, but that I could discourse of this part also, perchance not impertinently nor unprofitably; as one practised by long experience, and by your majesty's most indulgent favours, and no merit of mine own, raised by the degrees of office and honours to the highest dignity in the state; and have borne that office for four years; and, which is more, have been accustomed to your majesty's commands and conferences for the continued space of eighteen years together (which even of the dullest mould might fashion and produce a statesman); and who have spent much time, amongst other knowledges, in histories and laws. All which I report to posterity; not out of any arrogant ostentation; but because I presume it makes something to the honour and dignity of learning, that a man born for letters more than anything else, and forcibly carried away, I know not by what fate, against the bent of his own genius, to a civil active course of life, should yet be advanced to so high and honourable charges in the state, and that under so wise a king. But, if my times of leisure shall bring forth hereafter anything touching the wisdom of government and state matters, it will be, perchance, an abortive or an after birth." ["Either abortive or posthumous" are Bacon's words.] For the present he proceeds to say that he will merely append two summary treatises:—the first, on the doctrine of Extending the Bounds of Empire, or what he calls *Consul Paludatus* (the Consul attired in his military robes); the other, on Universal Justice, or the Fountains of Law. These two treatises make up the remainder of the Chapter. The first is merely the Twenty-Ninth *Essay*, entitled in the English "Of the True Greatness of Kingdoms and Estates."* The Latin is the same as in the Latin translation of the *Essays* executed under

* See vol. i. pp. 57-60.

Bacon's own inspection, though not published till some years after his death;* and it is worth noticing, that this Essay in particular is recorded to have been turned into Latin by Hobbes; for it can be no other which Hobbes's friend Aubrey means by what he calls the one entitled "Of the Greatness of Cities," which he says was one of three translated by Hobbes: the titles of the other two Aubrey had forgotten. It is more probable, perhaps, that the translation was made by Hobbes for the *De Augmentis* than for the projected Latin edition of the Essays. The other treatise, on Universal Justice, or the Fountains or General Principles of Law, is delivered in a succession of Aphorisms, extending to ninety-seven in all. It does not admit of abridgment. Only the first Title, or Division, On the Certainty of Laws, is given, as a specimen of a complete digest of the subject, which the noble author intimates that he entertains the hope of executing. The following striking paragraph, which is the same in the Latin as in the English, winds up the Chapter and the Book:—

Thus have I concluded this portion of learning touching civil knowledge; and with civil knowledge have concluded human philosophy; and with human philosophy, philosophy in general. And being now at some pause, looking back into that I have passed through, this writing seemeth to me, "*si nunquam fallit imago*"† as far as a man can judge of his own work, not much better than that noise or sound which musicians make while they are tuning their instruments; which is nothing pleasant to hear, but yet is a cause why the music is sweeter afterwards: so have I been content to tune the instruments of the muses, that they may play that have better hands. And surely, when I set before me the condition of these times, in which learning hath made her third visitation or circuit in all the qualities thereof; as the excellency and vivacity of the wits of this age; the noble helps and lights which we have by the travails of ancient writers; the art of printing, which communicateth books to men of all fortunes; the openness of the world by navigation, which hath disclosed multitudes of experiments and a mass of natural history; the leisure where-

* See vol. i. p. 23.

† If fancy does not deceive.

with these times abound, not employing men so generally in civil business as the states of Græcia did in respect of their popularity, and the state of Rome in respect of the greatness of their monarchy; the present disposition of these times at this instant to peace; the consumption of all that ever can be said in controversies of religion, which have so much diverted men from other sciences; the perfection of your majesty's learning, which as a phoenix may call whole volleys of wits to follow you; and the inseparable propriety of time, which is ever more and more to disclose truth—I cannot but be raised to this persuasion that this third period of time will far surpass that of the Græcian and Roman learning: only if men will know their own strength, and their own weakness both; and take one from the other, light of invention, and not fire of contradiction; and esteem of the inquisition of truth as an enterprise, and not as of a quality or ornament; and employ wit and magnificence to things of worth and excellency, and not to things vulgar and of popular estimation. As for my labours, if any man shall please himself or others in the reprehension of them, they shall make that ancient and patient request, “*Verbera, sed audi;*” * let men reprehend them, so they observe and weigh them: for the appeal is lawful, though it may be it shall not be needful, from the first cogitations of men to their second, and from the nearer times to the times farther off. Now let us come to that learning which both the former times were not so blessed as to know, sacred and inspired Divinity, the sabbath and port of all men's labours and peregrinations.

The Ninth and last Book of the *De Augmentis* is comprised in a single short Chapter. A different plan being followed in the treatment of the subject, a good many things in the corresponding portion of the *Advancement* are here left out. The beginning, however, is nearly the same in both treatises:—

The prerogative of God extendeth as well to the reason as to the will of man; so that, as we are to obey his law though we find a reluctance in our will, so we are to believe his word though we find a reluctance in our reason. For if we believe only that which is agreeable to our sense, we give consent to the matter, and not to the author; which is no more than we

* Strike, but hear.

would do towards a suspected and discredited witness; but that faith which was accounted to Abraham for righteousness was of such a point as whereat Sarah laughed, who therein was an image of natural reason.

Howbeit, if we will truly consider it, more worthy it is to believe than to know as we now know. For in knowledge man's mind suffereth from sense; but in belief it suffereth from spirit, such one as it holdeth for more authorised than itself, and so suffereth from the worthier agent. Otherwise it is of the state of man glorified; for then faith shall cease, and we shall know as we are known.*

Wherefore we conclude that sacred Theology (which in our idiom we call Divinity) is grounded only upon the word and oracle of God, and not upon the light of nature: for it is written, "Cœli enarrant gloriam Dei;"† but it is not written, "Cœli enarrant voluntatem Dei."‡ But of that it is said, "Ad legem et testimonium: si non fecerint secundum verbum istud,"§ &c. This holdeth not only in those points of faith which concern the great mysteries of the Deity, of the creation, of the redemption, but likewise those which concern the law moral truly interpreted: "Love your enemies; do good to them that hate you; be like to your heavenly Father, that suffereth his rain to fall upon the just and unjust." To this it ought to be applauded, "Nec vox hominem sonat:"|| It is a voice beyond the light of nature. So we see the heathen poets, when they fall upon a libertine passion, do still expostulate with laws and moralities, as if they were opposite and malignant to nature; "Et quod natura remittit, invida jura negant."¶ So said Dendamis, the Iudian, unto Alexander's messengers; "That he had heard somewhat of Pythagoras, and some other of the wise men of Græcia, and that he held them for excellent men: but that they had a fault, which was, that they had in too great reverence and veneration a thing they called law and

* A translation of the greater part of the passage in the *De Augmentis*, corresponding to this, has been already given in vol. i. pp. 162, 163.

† The heavens declare the glory of God.

‡ The heavens declare the will of God.

§ To the law and to the testimony: if they speak not according to this word, it is because there is no light in them

|| Nor does the voice sound like that of a mere mortal.

¶ What nature grants us, envious laws deny.

manners." So it must be confessed that a great part of the law moral is of that perfection whereunto the light of nature cannot aspire: how then is it that man is said to have, by the light and law of nature, some notions and conceits of virtue and vice, justice and wrong, good and evil? Thus, because the light of nature is used in two several senses; the one, that which springeth from reason, sense, induction, argument, according to the laws of heaven and earth; the other, that which is imprinted upon the spirit of man by an inward instinct, according to the law of conscience, which is a sparkle of the purity of his first estate: in which latter sense only he is participant of some light and discerning touching the perfection of the moral law. But how? sufficient to check the vice, but not to inform the duty. So then the doctrine of religion, as well moral as mystical, is not to be attained but by inspiration and revelation from God.

The use, notwithstanding, of reason in spiritual things, and the latitude thereof, is very great and general: for it is not for nothing that the apostle calleth religion our reasonable service of God; insomuch as the very ceremonies and figures of the old law were full of reason and signification, much more than the ceremonies of idolatry and magic, that are full of non-significants and surd characters. But most especially the Christian faith, as in all things, so in this, deserveth to be highly magnified; holding and preserving the golden mediocrity in this point between the law of the heathen and the law of Mahomet, which have embraced the two extremes. For the religion of the heathen had no constant belief or confession, but left all to the liberty of argument; and the religion of Mahomet, on the other side, interdicteth argument altogether: the one having the very face of error, and the other of imposture; whereas the faith doth both admit and reject disputation with difference.

In the *Advancement*, Bacon considers the Subject of Divinity in both its parts; "the matter informed or revealed, and the nature of the information or revelation." In the *De Augmentis* he writes (as the passage is rendered by Wats:)—"And now, most excellent king, we have with a small bark, such as we were able to set out, sailed about the universal circumference, as well of the old as the new world of sciences; with how prosperous winds and course we leave to posterity to judge. What

remains, but that, having accomplished our design, we should pay our vows? But there rests yet behind Sacred Inspired Divinity. Whereof, if we should proceed to entreat, we should [have to] depart out of the pinnacle of human reason, and go into the ship of the Church; which must alone be governed by a divine sea needle [only when governed by a divine compass is able] to direct her course aright. For the stars of Philosophy, which [have] hitherto shined forth unto us, and were our chief guide, here fail us: it were then meet we kept silence in this sacred subject. Whereupon we shall omit the just Partitions of this Knowledge; yet, notwithstanding, somewhat we will cast into this treasury, by way of good wishes, according to the proportion of our slender ability. This we do the rather, because we find no coast or space of ground in the whole body of Divinity lying vacant and untilled; so diligent have men been, either in sowing of good seed or sowing of tares." And he goes on to state, that he will therefore confine himself to the propounding of three Appendices of Theology, treating not of the subject matter of the science, but only of the manner in which it is conveyed to the mind. Neither, he adds, will he here subjoin treatises or examples, or lay down precepts, as he has done in other cases—that he will leave to theologians; all, he repeats, that he professes to offer are merely vows.

The three Appendices are,—the doctrine of the right use of Reason in religion; the doctrine of what he calls the degrees of Unity in the City of God; that is, of the principle of agreement which pervades the Scriptures, even when there seems to be a diversity between one part and another; and a succinct, sound, and judicious collection of annotations and observations on particular passages of Scripture, neither running into common-places nor digested into any methodical form, but retaining both the variety and the flavour belonging to the texts in their original position, which he would call Emanations of the Scriptures.

A considerable part, both of what is discarded from this portion of the *De Augmentis* and of what is retained,

is nearly the same with what is found in the "Advertisement" and the "Considerations," touching the Church of England,* and other theological writings of Bacon's. It will be enough that we transcribe another short passage from the *Advancement*, the substance of which, though somewhat differently arranged, is also found in the Latin. Two modes of expounding or interpreting Scripture have been mentioned, "which had need be contained within the bounds of sobriety;" the anagogical (or that which is inquisitive after mysteries), and the philosophical.

For the latter, it hath been extremely set on foot of late time by the school of Paracelsus, and some others, that have pretended to find the truth of all natural philosophy in the Scriptures; scandalizing and traducing all other philosophy as heathenish and profane. But there is no such enmity between God's word and his works; neither do they give honour to the Scriptures, as they suppose, but much imbase them. For to seek heaven and earth in the word of God (whereof it is said, "Heaven and earth shall pass, but my word shall not pass") is to seek temporary things amongst eternal: and as to seek divinity in philosophy is to seek the living amongst the dead, so to seek philosophy in divinity is to seek the dead amongst the living: neither are the pots or lavers, whose place was in the outward part of the temple, to be sought in the holiest place of all, where the ark of the testimony was seated. And again, the scope or purpose of the Spirit of God is not to express matters of nature in the Scriptures, otherwise than in passage, and for application to man's capacity, and to matters moral or divine. And it is a true rule, "*Auctoris aliud agentis parva auctoritas*;"† for it were a strange conclusion, if a man should use a similitude for ornament or illustration sake, borrowed from nature or history according to vulgar conceit, as of a basilisk, an unicorn, a centaur, a Briareus, an Hydra, or the like, that therefore he must needs be thought to affirm the matter thereof positively to be true.

The Scriptures, being given by inspiration, and not by human reason, do differ from all other books in the author: which, by consequence, doth draw on some difference to be

* See vol. i., pp. 138-159.

† The authority of an author travelling out of his subject is small.

used by the expositor. For the inditer of them did know four things which no man attains to know; which are, the mysteries of the kingdom of glory, the perfection of the laws of nature, the secrets of the heart of man, and the future succession of all ages. For, as to the first, it is said, "He that presseth into the light shall be oppressed of the glory." And again, "No man shall see my face and live." To the second, "When he prepared the heavens I was present, when by law and compass he enclosed the deep." To the third, "Neither was it needful that any should bear witness to him of man, for he knew well what was in man." And to the last, "From the beginning are known to the Lord all his works." . . .

It is an excellent observation which hath been made upon the answers of our Saviour Christ to many of the questions which were propounded to him, how that they are impertinent to the state of the question demanded; the reason whereof is, because not being like man, which knows man's thoughts by his words, but, knowing man's thoughts immediately, he never answered their words, but their thoughts: much in the like manner it is with the Scriptures, which, being written to the thoughts of men, and to the succession of all ages, with a foresight of all heresies, contradictions, differing estates of the church, yea and particularly of the elect, are not to be interpreted only according to the latitude of the proper sense of the place, and respectively towards that present occasion whereupon the words were uttered, or in precise congruity or contexture with the words before or after, or in contemplation of the principal scope of the place; but have in themselves, not only totally or collectively, but distributively in clauses and words, infinite springs and streams of doctrine to water the church in every part. And, therefore, as the literal sense is, as it were, the main stream or river; so the moral sense chiefly, and sometimes the allegorical or typical, are they whereof the church hath most use. Not that I wish men to be bold in allegories, or indulgent or light in allusions: but that I do much condemn that interpretation of the Scripture which is only after the manner as men use to interpret a profane book.

The conclusion of the *Advancement* is as follows:—

Thus have I made as it were a small globe of the intellectual world, as truly and faithfully as I could discover; with a note and description of those parts which seem to me not constantly occupate, or not well converted by the labour of man. In which, if I have in any point receded from that which is

commonly received, it hath been with a purpose of proceeding in "melius,"* and not in "aliud;"† a mind of amendment and proficience, and not of change and difference. For I could not be true and constant to the argument I handle, if I were not willing to go beyond others; but yet not more willing than to have others go beyond me again: which may the better appear by this, that I have propounded my opinions naked and unarmed, not seeking to preoccupate the liberty of men's judgments by confutations. For in anything which is well set down I am in good hope that, if the first reading move an objection, the second reading will make an answer. And in those things wherein I have erred, I am sure I have not prejudiced the right by litigious arguments; which certainly have this contrary effect and operation, that they add authority to error, and destroy the authority of that which is well invented: for question is an honour and preferment to falsehood, as on the other side it is a repulse to truth. But the errors I claim and challenge to myself as my own: the good, if any be, is due "tanquam adeps sacrificii,"‡ to be incensed to the honour, first of the Divine Majesty, and next of your majesty, to whom on earth I am most bounden.

In the *De Augmentis*, for the two last sentences, others to the following effect are substituted:—"Meanwhile there cometh into my mind that answer of Themistocles, who, when an ambassador from an inconsiderable town had made him a speech full of lofty expressions, checked him with the reply: 'Friend, thy words would require a city.' Assuredly I conceive that it may be most reasonably objected to me, that my words would require an age; a whole age, perhaps, to prove their truth, and many more to bring about their accomplishment. Nevertheless, seeing that even the greatest things are owing to their beginnings, it will be enough for me to have sown to posterity and to the everlasting God, whose divine Majesty I humbly implore through his Son and our Saviour, that these sacrifices of the human understanding, and other such as these, sprinkled with religion as with salt, and offered to his glory, he would graciously vouchsafe to accept."

* To a better object.

† To a different object.

‡ As the fat of the sacrifice.

Appended to the work is an enumeration, under the title of *Novus Orbis Scientiarum, sive Desiderata* (The New World of Sciences, or Things Desiderated), of the several branches of knowledge that have in the course of it been declared to be deficient, that is to say, imperfectly cultivated or not at all. This list may be regarded as a summary of the conclusions which it has been the object of the work to establish, and it is further interesting from several new Baconian designations which it contains. The following are enumerated as the *Desiderata* that have been noticed in Book II. ;—The Errors of Nature (*Errores Naturae*), or the History of Monsters (*Praeter-generationum*) ; the Fetters of Nature (*Vincula Naturae*), or Mechanical History ; Inductive History, or Natural History arranged for the building up of Philosophy ; the Eye of Polyphemus (*Oculus Polyphemi*), or the History of Learning ; History for the illustration of Prophecy (*Historia ad Prophetias*) ; Philosophy according to ancient Parables. Those in Book III. :—Primary Philosophy (*Philosophia Prima*), or the axioms common to all the sciences ; Living Astronomy (*Astronomia Viva*) ; Sound Astrology (*Astrologia Sana*) ; Continuation of Natural Problems ; Opinions (*Placita*) of the Ancient Philosophers ; the Part of Metaphysic which relates to the Forms of things ; Natural Magic, or deduction of Forms to Effects ; Inventory of Human Works ; Catalogue of things of Multifarious Use (*Polychrestorum*). Those in Book IV. :—The Triumphs of Man, or the doctrine of the Highest Flights (*de Summitatibus*) of Human Nature ; the Physiognomy of the Body in motion ; Medical Narrations ; Comparative Anatomy ; the Science of the Cure of Diseases held to be incurable ; Of Exterior Euthanasia (that is, the means of procuring an easy death so far as regards bodily sensation) ; Of Medicines of proved virtue (*de Medicinis Authenticis*) ; the Imitation of Natural Hot-springs ; the Medical Clue (*Filum Medicinale*, that is, a rule for the guidance of medical practice) ; the Prolongation of Life ; Of the Substance, or Essence, of the sensitive Soul ; Of the Efforts of the Spirit in Voluntary Motion ; Of the Difference between Perception and Sense ; the Root, or

Origin, of Perspective (*Radix Perspectivæ*), or the doctrine of the Form of Light. Those in Book V.:—Learned Experience, or the Chase of Pan (that is, of Nature); the New Instrument (*Novum Organum*); Particular Topics; Refutations of False Imaginations, or Sophisms (*Elenchi Idolorum*); Of the Analogy of Demonstrations. Those in Book VI.:—Of the Marks of Things; Philosophical Grammar (*Grammatica Philosophans*); the Transmission of the Light, or Method of handing down Knowledge to posterity (*Traditio Lampadis, sive Methodus ad Filios*); Of the Wisdom (*Prudentia*) of Private Discourse; the Colours of apparent Good and Evil, both simple and comparative; Antithetical Statements of Truths (*Antitheta Rerum*); the Minor Formulæ of Oratory. Those in Book VII.:—Serious Satire, or the doctrine of the insides of things (*Satira Seria, sive de Interioribus rerum*); the Georgics of the Mind, or the Culture of the Moral nature. Those in Book VIII.:—The Amanuensis of Life, or the doctrine of Dispersed Occasions (*De Occasionibus Sparsis*); the Architect of Fortune, or the doctrine of Rising in Life (*Faber Fortunæ, sive de Ambitu Vitæ*); the Military Statesman (*Consul Paludatus*), or of Extending the bounds of Empire; the Idea of Universal Justice, or the doctrine of the Fountains of Law. Those in Book IX.:—Sophron, or the doctrine of the Right Use of Human Reason in Divinity; Irenæus, or the doctrine of the degrees of Unity in the City of God; the Celestial Wine-skins (*Utres Coelestes*), or the Emanations of the Scriptures.

Such is the survey of human knowledge, and of the world of possible speculation, which Bacon takes in the "Two Books of the Proficiency and Advancement of Learning," and the Nine Books of the treatise "De Dignitate et Augmentis Scientiarum," into which they were afterwards expanded. It is remarkable that the second work, published after so long an interval, should exhibit so little deviation from the first, except only in the way of extension, and here and there of somewhat greater precision of statement. Scarcely any thing to be

found in the *Advancement* is either contradicted or even by implication retracted or abandoned in the *De Augmentis*; the few omissions are of passages, which, on whatever account their retention may have been thought objectionable, make no part of the exposition of the author's philosophical views, and seem to have been discarded only on the principle indicated in his letter, already quoted, to the King, in which he says that he had been his own *index expurgatorius*, in order that the work might be read in all places.* The substance, too, of the *Advancement*, there is reason to believe, had been for the greater part excogitated, and to some extent even reduced to the shape in which we actually have it, a considerable time before it was published. In a letter sent to his friend Matthew with the printed volume, Bacon, as we have seen, speaks of the First Book as having been seen by Matthew in a completed state, it may have been years before. But, however this may be, there is at any rate a perfect or nearly perfect consistency throughout the whole course of Bacon's writings, in so far as they relate to what is commonly understood by his system of philosophy, whether they may have come from his pen in the earlier portion, in the middle, or towards the close of his life. His views are of course more fully developed in those of them that are of later date; but even in the earliest, if we do not find the seeds of all his subsequent speculations, we can detect nothing which entitles us to infer that his opinions had ever undergone any change. There is every reason to believe that his chaplain Rawley only states the fact when he tells us that it was while he was still at the University, and as yet only in his sixteenth year, that he fell into that dislike of the philosophy of Aristotle, in which he continued to his dying day.† It may be reasonably supposed, however, to have been not till a somewhat later date that he arrived at those other views which are regarded as constituting his own philosophy. He has himself, indeed, noted when it was that these new views first assumed any thing of distinctness

* See ante, page 39.

† See vol. i. p. 11.

and consistency in his mind. In his letter to Father Fulgentio, written in 1623 or 1624, after speaking of the zeal and constancy with which he had cherished the scheme of his *Instauratio Magna* through so many years, he proceeds (to adopt the translation in the *Biographia Britannica*):—"For well I remember that forty years ago I composed a juvenile work about these things, which, with great confidence I graced with the swelling title of The Greatest Birth of Time (*Temporis Partus Maximus*)." This would be when he was in his twenty-third or twenty-fourth year.

The great principle of the Baconian philosophy, however, the investigation of nature by experiment, is only generally indicated either in the *Advancement of Learning*, or even in the *De Augmentis*. Its complete explanation, and the method of applying it, form the subject of the Second Part of the *Instauratio Magna*, the *Novum Organum*, to which we now proceed.

SECTION III.

THE NOVUM ORGANUM, FORMING THE SECOND PART OF
THE INSTAURATIO MAGNA.

THIS Second Part of the *Instauration*, it is to be recollected, was the portion of the work that was first published. It appeared in a folio volume in October, 1620, with the title of 'Novum Organum Scientiarum, sive Instaurationis Magnae Pars Secunda.' The First Part of the *Instauration*, the treatise 'De Dignitate et Augmentis Scientiarum,' which we have just reviewed, was not given to the world till 1623, with the exception of so much of it as is contained in the 'Two Books of the Proficiency and Advancement of Learning,' which had been published in 1605.

The amplification of the Two Books of the *Advancement* into the Nine Books of the *De Augmentis*, and the adaptation of the extended treatise to form the First Part of the *Instauration*, would appear not to have been contemplated in the original design of that work, nor even when the Second Part of it, the *Novum Organum*, was first published. At the head of the latter, as has been already mentioned, was given an intimation to the effect that the First Part of the *Instauration*, containing the Partitions of the Sciences, was wanting; but that the said Partitions might in part be sought from the Second Book of the 'Proficiency and Advancement of Learning.' The two treatises, the *De Augmentis* and the *Novum Organum*, were afterwards distinctly connected by the publication along with the former both of the short prefatory advertisement by Rawley, and of a note at the end stating that after the *De Augmentis* followed in order the Second Part of the *Instauration*, explaining

the art of interpreting nature, and of the true application (*adoperationis*) of the intellect; not however in the form of a finished treatise, but only digested, according to the heads of the subject, into aphorisms. The subordinate title of the *Novum Organum* is 'Indicia de Interpretatione Naturae, sive de Regno Hominis' (Indications respecting the Interpretation of Nature, or respecting the Kingdom of Man).

The reader has already been informed that to the *Novum Organum* were prefixed various prolegomena which are properly to be regarded as introductory to the entire body of the *Instauratio Magna*. The *Novum Organum*, however, has also its own Preface, specially explaining its nature and design.

In this discourse Bacon begins by observing that they who have pronounced of nature as of a thing already explored have done the highest detriment to philosophy and the sciences, by extinguishing inquiry exactly in proportion as they have gained credit; while they who, on the other hand, have asserted that nothing can be certainly known, although they have adduced reasons for their opinion not to be despised, have yet also altogether exceeded the bounds of truth. The more ancient of the Greek philosophers, whose writings have perished, appear to him to have taken a wiser course than any of their successors; keeping a middle way between dogmatism and scepticism, and moreover being accustomed to test and judge of nature rather by experiment than by disputation: yet even they followed no rule or system in their experiments, but employed only the unregulated force of the intellect, and placed all their dependence upon intense meditation and perpetual revolution and agitation of mind. He then proceeds to describe generally his own method, as consisting in guarding the sense by what he calls a certain reduction (*per reductionem quandam*), by which he perhaps means a drawing of it back to its proper function; in rejecting for the most part the mental operation which follows the sense—that is, apparently, the conclusion to which the under-

standing is naturally inclined to come at once on receiving the intimation of the sense;* and in laying open and fortifying for the mind a new and certain road from the very perceptions of the senses. That the mind requires some props or helps he holds to have been without doubt perceived by those who assigned so great a part to Logic; but that art, from the manner in which it was employed, was rather efficacious in rivetting errors than in disclosing truth; so that nothing, he conceives, remains but that the whole work of the mind be begun afresh; that from the very commencement the mind be in nowise left to itself, but always forced to proceed according to rule; and that the business be finished as if by means of machinery. The necessity of mechanical aid for the production of all great effects in works of the hand is insisted upon as an illustration and proof of a similar necessity in works of the mind. Two special admonitions are then propounded; the first relating to persons, the second to things. The honour and reverence due to the ancients Bacon professes to be desirous of allowing to remain undiminished and untouched; with them he comes into no opposition or rivalry; the intellectual road or method by which he proposes to pursue his end is one which was to them wholly untried and unknown. Nor is it any part of his purpose to attempt to throw down either the actually received philosophy, or any other system, more correct or more comprehensive, which may exist or may arise. He does not deny but that the received philosophy and other systems of the like kind may be employed pro-

* This obscure passage is rendered by Shaw,—“to guard the sense by a kind of reduction” (explained in a foot-note as meaning, “by contriving ways of transmitting things, in a proper manner, to the senses, that a true judgment may be formed of them when thus again brought under view”); “generally to reject that work of the mind which is consequent to sense.” Mr. Wood’s translation is,—“We, as it were, restore the senses to their former rank, but generally reject that operation of the mind which follows close upon the senses.”

perly and with good effect in promoting discussion, in embellishing oratory, in the professorial office, in the business of civil life. Nay, he adds, we openly intimate and declare that the philosophy which we bring forward will not be very useful for such purposes. It is not ready at hand ; it is not to be caught hold of in passing ; it does not flatter the understanding through its preconceived notions ; it does not descend to the apprehension of the multitude, excepting only in its utility and its effects. Let there be, then, he continues, and well and happy may it prove for both, two emanations and also two dispensations of learning ; two tribes and, as it were, kindreds of contemplators or philosophers ; and they not enemies or aliens the one to the other, but confederated and bound together by assistance mutually rendered : in a word, let there be one method of cultivating the sciences, and another of discovering them. The former he afterwards proposes to call the Anticipation of the Mind ; the latter, the Interpretation of Nature. He concludes by requesting that the reader, notwithstanding all the pains he has taken to make his statements not only true but perspicuous, will not expect to acquire a full understanding and conviction of what the work sets before him by a cursory or inattentive perusal of it, but that whoever would really comprehend the new system of philosophy will try the method for himself, will accustom his mind to that subtilty of things which experiment alone discovers, will finally correct the depraved and deeply inherent habits of his mind by a temperate and as it were legitimate hesitation, and will then only (if it should so please him) make use of his judgment after he has begun to be master of himself.

The First Book of the *Novum Organum* is, not perhaps in respect of its pure Latinity, but yet in all such essential qualities of writing as do not depend upon the usages of a particular language, one of the most perfect of human compositions. Every sentence has evidently been elaborated with the greatest care ; and yet the easy unforced vigour and animation of the expression are as remarkable as its economy, compactness, and perspicuity. Nothing

is redundant, and yet nothing is harsh or cramped: it would be difficult to mention any other writing in which aphoristic concentration and energy are so admirably blended with all the highest qualities of illustrative and frequently even decorative eloquence. No where else, probably, is there to be found either so crowded a succession of brilliant sentences, or yet a splendour more mild and grateful.

Much of this power and beauty must be lost in the best translation; some of it is perhaps due to qualities in the Latin language which the English does not possess, and might have been wanting if the work had been written by Bacon himself in his mother tongue—although in that case its place would probably have been supplied by something as good of a different kind. The first English translation of the *Novum Organum* professing to be complete was that given by Shaw in his edition of Bacon's Philosophical Works, 3 vols., 4to, London, 1733. The next is that published in the 14th volume of Mr. Montagu's edition of Bacon's Works, 8vo., London, 1831, which was executed by Mr. William Wood. And there is a third translation, of which, however, we have seen only the First Book, by the late James Glassford, Esq., 8vo., Edinburgh, 1844.

The first four aphorisms of Book First may be regarded as enunciating the principles or ideas that form the basis of the work. They may be thus literally translated:—

1. Man, the servant and interpreter of nature, does and understands so far as he may have observed, respecting the order of nature, in things or in his mind;* and further he has neither knowledge nor power.

* That is, by simple observation of facts, or by meditation upon them. The original is "quantum, de naturae ordine, re vel mente observaverit." In the *Distributio Operis*, where the aphorism is given in the same terms with the exception of this one phrase, we have "opere vel mente observaverit." In either case the distinction that is intended to be marked is between things, facts, effects, and the inferences which the

2. Neither the naked hand, nor the understanding left to itself, can do much; the work is accomplished by instruments and helps; of which the need is not less for the understanding than for the hand. And as the instruments of the hand either excite or guide its motion, so also the instruments of the mind either prompt or guard the understanding.

3. Human knowledge and power coincide, because ignorance of the cause frustrates the effect. For nature is not conquered except by obeying her; and whatever in contemplation is of the nature of a cause, that in operation is of the nature of a rule.

4. For works man can do nothing else than apply and remove natural bodies; the rest nature performs within herself.

The next fourteen aphorisms are employed in pointing out how little had yet been done by man, and the causes of the imperfect state in which the arts and sciences still remained. Although the number of processes known and practised, it is observed, might be thought considerable, yet the number of axioms discovered was small; the sciences as they existed, Bacon complains, were only arrangements of things actually found out, not methods of invention, or designations of new operations. All this he conceives to have arisen from the over-estimation in which men have held the unassisted powers of the human mind, and their consequent neglect of its true helps. And then he expatiates, in nearly the same words as in the *De Augmentis*, upon the inutility, and worse than inutility, of the common logic in the invention or promotion of science, upon the defects of the syllogism, and upon the erroneous character of most of the received notions in physic, as well as the insufficiency of the evidence on which they rest.

mind draws from them. Mr. Glassford's version is, "may have observed by sense or mentally." Mr. Wood translates,—"Man, as the minister and interpreter of nature, does and understands as much, as his observations on the order of nature, *either with regard to things or the mind*, permit him." If not positively wrong, this is certainly at least obscure and liable to be entirely misunderstood by an English reader. "Observations on the order of nature, *with regard to the mind*" is no part of Bacon's idea. What he speaks of is, distinctly, observation *by* the mind.

The old and the new, the wrong and the right way of proceeding are thus stated in the 19th aphorism :

There are and can be but two ways of investigating and discovering truth. The one from sense and particulars flies to the most general axioms, and from those principles and their never questioned truth judges of and derives intermediate axioms ; and this is the way in use. The other raises axioms from sense and particulars, by ascending continuously and step by step, so that the most general axioms are arrived at in the last stage ; which is the true way, but untried.

When the intellect is left to itself it takes the first way, after the order observed in logic. A man of a sober, patient, and grave disposition may, even with his understanding left to itself (especially if it be not impeded by the received doctrines) sometimes try the other way ; but he will not advance far in it. The difference between the two methods, it is then pointed out in the 22nd aphorism, lies wholly in the way in which the mind ascends from the senses and from particulars to general truths. They both begin with the former and end with the latter ; but in the one experiments and particulars are only cursorily glanced at, in the other they are considered carefully and after a certain plan ; the one sets out with the establishment or assumption of a number of abstract and useless general principles ; the other rises by degrees to those which are in reality the best known to nature. There is no small difference between the *Idola*, or false images, of the human mind, and the ideas of the divine mind ; that is, between certain vain opinions, and the true signatures and impressions made upon created things, as really discovered. The axioms in common use, it is remarked in the 25th aphorism, were all derived from a very scanty experience wholly gathered by the unassisted hand,* and from a small number of particular

* But we are not sure that this is what Bacon means by "ex tenui et manipulari experientia," literally, from an experience scanty and held in the hand. Mr. Wood's translation is, "from a scanty handful, as it were, of experience ;" Mr. Glassford's, "from a slender and manipular experience."

facts of most common occurrence: if any instances presented themselves which had not been before observed or known, the axiom, instead of being properly corrected, was wont to be saved, or maintained unaltered, by means of some frivolous distinction.

The Twenty-sixth Aphorism repeats the intimation already given in the Preface, that the investigation of nature by human reason alone will be called the Anticipation of Nature, as being a method both rash and premature; and that the name of the Interpretation of Nature will be reserved for that method which is in a proper manner elicited from things. In subsequent aphorisms we have an amplification of what has been further stated in the Preface as to the advantage that anticipations have in producing unanimity—for if all men were even to become insane in one way, and with conforming notions, they might agree very well among themselves; while, on the contrary, interpretations have no power of suddenly striking the understanding, so that, in so far as regards conclusions hard to be believed and at variance with common opinions, they must seem almost like mysteries of faith. Yet, while anticipations and logic may be properly employed in sciences which are founded upon opinion, where the object is to subjugate not the realities of nature but the assent of men's minds, no progress could ever be made by that method in true science, even if all the capacities of all ages should unite, and combine and transmit their labours.

The Thirty-eighth Aphorism introduces us to the doctrine of the *Idola* and false notions occupying the human understanding, of which a sketch has also been given in the Fifth Book of the *De Augmentis*. The Latin, or rather Greek, word, *Idola*, it is to be observed, does not mean what we call idols or false divinities; nor does Bacon anywhere so express himself as to lead us to suppose that he intended it to suggest such a notion, although he has been commonly so understood. The English word that answers best to both the classical and the Baconian *idola* (which are the same) is *spectres*.*

* Cicero, in a letter to his friend Caius Cassius (*Fam.*, xv.

The *Idola* and false notions, it is declared in this Thirty-eighth Aphorism, which have taken possession of the human understanding, do not only oppose the entrance of truth, but, even after it has obtained admission, will meet and molest us in the restoration of the sciences, unless men, forewarned, shall, as far as it can be done, guard themselves against them.

The *Idola* which beset the human mind are declared to be of four kinds:—the *Idola Tribus* (Spectres of the Tribe or Species); the *Idola Specus* (Spectres of the Cave or Den); the *Idola Fori* (Spectres of the Market-place); and the *Idola Theatri* (Spectres of the Theatre). The Spectres of the Tribe are such deceiving or blinding opinions and tendencies as are inherent in the very nature of man, and arise from the distorted views of things which are occasioned by the imperfection both of our senses and of our minds. The Spectres of the Den are the false notions peculiar to each individual. For every man, we are told, beside the aberrations belonging to human nature in general, has a certain den or cavern of his own, which breaks and corrupts the light of nature; and this comes either of his proper and distinctive disposition or character, or of his education and his intercourse with other men, or of his reading of books and the authority of the persons whom he respects and admires, or of the different impressions that the same things and considerations make according as they present themselves to a mind preoccupied and predisposed, or to one in an equable and calm state, or of other like causes. The Spectres of the Market-place are those prevalent misconceptions that are begotten of the intercourse of men with one another; which is necessarily carried on by words; and words are imposed according to the apprehension of the multitude, and are consequently full of folly and mischief. Finally, the Spectres of the Theatre are those that have been raised in the minds of men by the diverse dogmas of the

16), observes that Catus, the Epicurean, who had lately died, had given the name of *Spectra* to what Epicurus himself, and, before him, Democritus, had called *ἰδωλα*.

several philosophical systems, and even by the perverted rules laid down for demonstration ; and they are so called because, says Bacon, all the philosophies that have been received or invented we regard as only so many plays produced and acted, which have created fictitious and theatrical worlds. He then proceeds to consider each description of spectres more at length by itself.

First, as to the Spectres of the Tribe. Their causes, or sources, are the following :—1. The human understanding is so constituted that it is apt to assume a greater order and equality in nature than is found actually to exist. 2. The human understanding, when it has once got hold of any notion, or supposed principle, is given to make all the facts it afterwards meets with accord with that, and lend it their support. It is also much more easily moved and excited by affirmatives than by negatives ; that is, by instances that seem to support its preconceived notions, than by such as seem to be opposed to them. 3. The human understanding is most stirred by those things that strike and enter the mind at once and suddenly, and by which the fancy is wont to be filled and inflated : hence it conceives to itself all other things as of the same kind with those few by which it is beset and possessed, and is slow in making its way to those remote and heterogeneous instances by which axioms are proved as by fire. 4. The human understanding is incapable of standing still or resting in any conclusions, but will still be pressing forward, with however vain an effort. It cannot conceive any extreme boundary of the universe ; nor, on the other hand, can it find for itself any firm footing either upon the idea of infinity in duration, or upon that of the infinite divisibility of lines. But this impotency of the mind chiefly proves pernicious in the discovery of causes ; incapable of resting satisfied with those of greatest generality, beyond which nevertheless it is impossible to go, in searching for others farther away it falls upon such as are in fact nearer, namely, what are called final causes, that is, the mere purposes or designs with which things are supposed to have been created, a class of considerations which plainly belongs rather to

the nature of man than to that of the universe. Hence a wonderful corruption of philosophy. 5. The human understanding does not consist of a dry light, but receives an infusion from the will and the affections; so that what a man would most wish to be true, that he most readily believes. And thus he rejects what is difficult, from impatience of inquiry; what is sober, because it narrows his hopes; the deeper things of nature, from superstition; the light of experience, from arrogance and pride, lest the mind should seem to be occupied with things low and fluctuating; paradoxes, on account of the opinion of the multitude: in fine, passion imbues and infects the understanding in innumerable ways, and in such as are sometimes imperceptible. 6. But by far the greatest impediment and source of error in the human understanding comes from the dulness, incompetency, and deceiving nature of the senses. Those things that strike the sense always preponderate over those that do not. Thus contemplation almost ends with sight; so that things that are not discerned by the eye are hardly observed at all. But the senses by themselves are weak and erring; nor can even instruments avail much to amplify or sharpen them; all truer interpretation of nature is accomplished by instances, and fit and apposite experiments; where the senses judge only of the experiment, the experiment of nature and of the thing itself. 7. Moreover, the human understanding is by its very nature carried towards the abstract, and things which are really fluctuating it will assume to be constant. But it is better to dissect nature than to abstract it; as was the practice of the school of Democritus, which penetrated farther into nature than the rest. Such, then, are the Spectres of the Tribe; which have their origin either in the equality of the substance of the human mind, or in its preoccupation, or in its limited powers, or in its unquiet motion, or in the infusion of the affections, or in the incompetency of the senses, or in the mode in which impressions are made.

The Spectres of the Den are the subject of the six aphorisms from the 53rd to the 58th inclusive. They

are described as originating in each individual's peculiar nature or constitution, both mental and corporeal ; and also from education, habit, and fortuitous circumstances. For example, some men have an undue attachment to particular sciences and contemplations, either because they believe themselves to be their authors and discoverers, or because they have bestowed most time and study upon them ; and if such persons apply themselves to philosophy and the contemplation of nature in general, they are apt to wrest and corrupt their investigations by their preconceived fancies ; as Aristotle has wholly enslaved his natural philosophy to his logic, as the modern chemists have set up a fantastic philosophy out of a few experiments of the furnace, as Gilbert, after his laborious study of the magnet, proceeded to rear an entire system upon his magnetical discoveries or views. But the greatest distinction, and one which is as it were radical, between the dispositions of different men in regard to philosophy and the sciences, is, that some minds are better fitted, and gifted with more power, for noting the differences, others for noting the resemblances of things. Some, again, are ardently given to the admiration of antiquity, others are so constituted as to rush into the love and embrace of novelty. Care must be taken that the understanding be not carried away by either of these passions. Lastly, there is danger that the understanding be distracted and enfeebled by the contemplation of nature and of bodies in their simplicity,—that is, singly or in detail ; and, on the other hand, lest it be stupified and relaxed by the contemplation of them in composition and in their configuration, or mere conformity to some general principle. On the whole the Spectres of the Den may be affirmed to arise for the most part from certain predominant views, or from an excessive addictedness either to composition or to division (that is, to the synthetic or the analytic mode of viewing things), or from a preference for one age of the world or period of time to another, or from the largeness or minuteness of the objects contemplated (that is, as we might express it, in a phraseology that would not have been so intelligible

in Bacon's day, from the telescopic or microscopic character of the mind).*

The Spectres of the Market are characterised as the most troublesome of all. They, as before stated, are those which have insinuated themselves into the understanding from the associations of words and names. They are of two kinds; either names of things which do not exist, or names confused and ill-constructed, and inconsiderately and unfairly (*inaequaliter*) abstracted from things. The false notions produced by the latter are those that cling most obstinately to men's minds.

Lastly, the Spectres of the Theatre are discussed in the seven aphorisms from the 61st to the 67th inclusive. These are neither native to the mind, nor do they make their way into it by any secret insinuation; but are introduced by and received openly from the fabulous representations of philosophical theories, and from the perverse established rules of reasoning. At the same time, Bacon repeats, he has no quarrel with the authors of these theories about anything more than the method of inquiry. Let the ancients, he exclaims, keep their honours. But, as they say, a lame man in the right path will outstrip the swiftest runner out of it; for it is clear that, the stronger and swifter the latter is, the farther will he be carried from his object. His own method Bacon describes as leaving little to acuteness and strength of wit, but, on the contrary, as almost reducing all wits and intellects to the same level. This strange notion appears to have been deeply implanted in his mind. The Spectres of the Theatre, he proceeds to observe, are very numerous, and may and perhaps will be some time much more so. The comparatively small number of new philosophical theories that the modern world had produced he attributes to men's minds having

* The Latin is "ex objectis largis et minutis;" but the indefiniteness of the expression is sufficiently explained by the 57th aphorism, of which it is a brief summary. Mr. Wood's translation—"the extent or narrowness of the subject"—can scarcely be considered to convey Bacon's meaning. Mr. Glassford translates, "from largeness or minuteness of the objects presented."

been for many ages so much occupied with religious and theological questions. False philosophy he divides into three kinds; sophistical, empirical, and superstitious. The following is the 63rd Aphorism, as translated by Mr. Wood :—

Aristotle affords the most eminent instance of the first, for he corrupted natural philosophy by logic :—thus he formed the world of categories, assigned to the human soul, the noblest of substances, a genus determined by words of secondary operation, treated of density and rarity (by which bodies occupy a greater or lesser space) by the frigid distinctions of action and power, asserted that there was a peculiar and proper motion in all bodies, and that, if they shared in any other motion, it was owing to an external moving cause, and improved innumerable arbitrary distinctions upon the nature of things; being everywhere more anxious as to definitions in teaching, and the accuracy of the wording of his propositions, than the internal truth of things. And this is best shown by a comparison of his philosophy with the others of greatest repute among the Greeks. For the similar parts of Anaxagoras, the atoms of Leucippus and Democritus, the heaven and earth of Parmenides, the discord and concord of Empedocles, the resolution of bodies into the common nature of fire and their condensation according to Heraclitus, exhibit some sprinkling of natural philosophy, the nature of things, and experiment, whilst Aristotle's *Physics* are mere logical terms; and he remodelled the same subject in his *Metaphysics* under a more imposing title, and more as a realist than a nominalist. [Nor is much stress to be laid on his frequent recourse to experiment in his books on *Animals*, his *Problems*, and other treatises; for he had already decided, without having properly consulted experience as the basis of his decisions and axioms, and, after having so decided, he drags experiment along as a captive constrained to accommodate herself to his decisions: so that he is even more to be blamed than his modern followers (of the scholastic school) who have deserted her altogether.

The Empiric philosophy produces conclusions more deformed and monstrous than the Sophistic, or that which proceeds merely upon reasoning (*rationale genus*); because it is founded not upon the light of vulgar notions (which, although weak and superficial, yet is in a sort universal and pertinent to many things), but upon the narrowness and obscurity of a few experiments. The

philosophy of the alchemists and that of Gilbert are again referred to as instances. There is considerable danger, Bacon thinks, that even his own method, of which experiment makes so important a part, may in after times give birth to much erroneous philosophizing of the empiric kind.

This is Mr. Wood's translation of the 65th Aphorism :—

The corruption of philosophy by the mixing of it up with superstition and theology is of a much wider extent, and is most injurious to it both as a whole and in parts. For the human understanding is no less exposed to the impressions of fancy, than to those of vulgar notions. The disputatious and sophistic school entraps the understanding, whilst the fanciful, bombastic, and, as it were, poetical school, rather flatters it. [Mr. Wood has omitted the next sentence :—For there is inherent in man a certain ambition of the intellect, not less strong than that of the will ; especially in high and soaring wits.] There is a clear example of this among the Greeks, especially in Pythagoras, where, however, the superstition is coarse and overcharged ; but it is more dangerous and refined in Plato and his school. This evil is found also in some branches of other systems of philosophy, where it introduces abstracted forms, final and first causes, omitting frequently the intermediate, and the like. Against it we must use the greatest caution ; for the apotheosis of error is the greatest evil of all, and where folly is worshipped, it is, as it were, a plague-spot upon the understanding. Yet some of the moderns have indulged this folly with such consummate inconsiderateness, that they have endeavoured to build a system of natural philosophy on the First Chapter of Genesis, the Book of Job, and other parts of Scripture ; seeking thus the dead amongst the living. And this folly is the more to be prevented and restrained, because not only fantastical philosophy but heretical religion spring from the absurd mixture of things divine and human. It is therefore most wise soberly to render unto faith the things that are faith's.

So much for the erroneous manner of viewing nature ; the vicious or wrong matter of contemplation is next discussed. It is observed that the human understanding, infected by the inspection of the processes of the mechanical arts, in which bodies are so much changed by compositions and separations, is apt to assume that something

of the same kind takes place in universal nature. Hence the fiction of elements, and their concurrence, for the production of natural bodies. Again, we find in nature different species of things, such as animals, plants, minerals; whence we are prone to fall into the imagination that there are certain primary forms which nature always strives to produce, and that the remaining variety comes of the impediments and aberrations experienced by nature in the accomplishment of her work, or of the conflict of different species, and the transformation of one into another. Hence the doctrine of elementary qualities, and that of occult qualities and specific virtues. But it is a much greater evil that men are given to contemplate and inquire into rather the quiescent principles out of which than the moving principles by which things are made. For the former all look to the purposes of discourse; only the latter to actual effects. As examples of the latter, and as principles worthy of observation, Bacon mentions the mutual appetite or inclination for contact which he says there is in bodies, so that they will not permit the unity of nature to be ever entirely destroyed or cut asunder and a vacuum to be formed; the disposition of bodies to return to their natural dimension and degree of tension, so that, if they be either compressed within it or drawn out beyond it, they will strive to recover and restore themselves into their former sphere and extent; and the other disposition which he conceives bodies to have of congregating towards masses of those of the same nature, the dense, namely, towards the globe of the earth, the weak and rare towards the concavity of heaven. These assumptions may serve as specimens of Bacon's principles or general notions of natural philosophy. He adds that another evil not less considerable is the habit or tendency men have, in their philosophies and contemplations, of bestowing their labours in investigating and discussing the principles or beginnings of things, and what he calls the ultimities (*ultimitatibus*), meaning, apparently, the extreme possibilities, of nature; whereas all utility and operative power consists in what is intermediate.

The subject of the Spectres of the Theatre, and of these

mental spectres of all kinds, is concluded by a caution against the intemperate tendency of one class of philosophical theories to yield assent, and of another to withhold it; of the positive or dogmatic schools on the one hand, and of the sceptical on the other. Both tendencies, it is remarked, have the effect of fixing and in a manner perpetuating spectres, or false notions, by shutting out the light that would remove them. The first depresses, the second enervates the understanding. The former marked the philosophy of Aristotle: the latter, that of Plato, and still more that of the New Academy, which dogmatised scepticism and distinctly professed it as a tenet. Bacon admits the sceptical spirit to be more honest (as his word, *honestior*, seems here to mean) than the dogmatic; but yet, he observes, when the human mind has once despaired of discovering truth, all its operations become languid, and men rather turn aside to pleasant disputations and discourses (*discursus*), and to a sort of wandering over things, than persist firmly in severity of investigation. But, he adds, what we have said from the first, and what we constantly keep in view, is, not that the senses and the human understanding, with all their weakness, are to be denied all authority, but only that they are to be furnished with assistance. Finally he declares that all these Spectres of all kinds, must be by a solemn determination abjured and renounced,* and the understanding wholly liberated and cleansed from them, so that there shall be no other

* The words here used by Bacon—"abneganda et renucianda," might at first seem to give some countenance to the supposition that he used the Latin word *Idola* in the sense in which it is found in the ecclesiastical writers, or for what we now call *idols*. And he may have been betrayed for a moment into such a conception of the term. But even this passage, looked at in the whole, scarcely admits of such an interpretation: the *idola* become again immediately mere shadows, blinding or perverting the mental vision—false notions and prejudices from which the mind must be delivered and cleansed, so that the student of philosophy may become like a little child. One does not become such by renouncing idols.

access to that kingdom of man which has its foundation in the sciences, than there is to the kingdom of heaven, which it is not given to any one to enter who does not come in the character of a little child.

Having now gone through the more systematic portion of the book, a more cursory survey of the remainder will be sufficient. Instead of an analysis of every aphorism, we shall notice only those that are most important or remarkable.

From the Spectres of the mind the author proceeds to those depraved methods of reasoning by which, he says, they are supported and defended. There are four steps, he observes, and as many vices or errors, in the processes universally employed in deducing axioms and conclusions from things and perceptions. First, the impressions of the sense itself are deceptive. Secondly, notions or conceptions are erroneously abstracted from the impressions of the senses. Thirdly, the induction is erroneous, which determines the principles of science by means of a simple enumeration of facts, without the application of the proper exclusions and solutions, or separations, of nature. Lastly, the method of discovering and proving, according to which the more general principles are first established, and then intermediate axioms are applied to them and tested, is the mother of errors and the bane of all the sciences. Then come the following aphorisms, being the 70th, 71st, 72nd, and 73rd; which we give as they are translated by Mr. Glassford :—

70. But by far the best demonstration is experience, or trial, provided it cleave to the very experiment. For if it be translated to others which are accounted like, unless that translation be justly and orderly made, it is a deceitful thing. Now, the manner of experimenting which men use at present is blind and stupid. Accordingly, while they stray and wander by no certain road, but take counsel only from occurrence or jumble of things, they are carried about to many things, but advance little; and sometimes they are elate, sometimes are perplexed or confounded, and always find what to seek farther. And so it nearly happens, that, in experiment, men assay with levity, and, as it were in play; just a little changing experiment already known; and if the affair misgives, distasting and forsak-

ing the endeavour. Or if, with more gravity, and fixedness, they gird themselves to experiment, they yet bestow their labour in digging and turning over some one experience; as Gilbert in the loadstone, the chemists in gold. Now, this men do with a purpose and direction not less unskilled than futile. For no one explores the nature of anything with felicity in the thing itself; but the inquiry is to be enlarged to what are more general.

Or, even if they do endeavour at a sort of science and positive doctrine from experiments; yet, almost in every case, through an over-hasty and untimely eagerness, they turn aside to practical application of them; not only because of the profit and fruit of such practice, but that in some new work they may as it were, snatch a pledge to themselves, that they are about to be not unprofitably employed in the rest; and also recommend themselves to others,* for the purchase of a better repute concerning those things in which they are engaged. Thus it happens that in the manner of Atalanta, they go aside to take up the golden apple; but in doing so interrupt the course, and let victory slip from their hands. Whereas, in the true lists of experiment, and carrying it forward to production of new works, the divine wisdom and order are, by all means, to be taken for the pattern. But, on the first day of the creation, God created light only, and to that work allotted the entire day; nor created on that day any materiate work. In like manner, and by experiments in every kind, the discovery of causes and true axioms is first to be elicited; and experiments of light, not of fruit, to be inquired. Axioms again, when rightly deduced and constituted, supply uses of practice, not straitened or scantily, but in numbers; and draw after them bands and troops of works. But of the ways of experimenting, which not less than the ways of judging, are blocked up and intercluded, we shall discourse afterwards; having, for the present, only spoken of the common experience as of a faulty demonstration. And now the order of things requires, that we subjoin somewhat concerning those signs (or indications) which we mentioned a little before, (of distemperature in the received philosophies and contemplations) and concerning the causes of a thing at first view so surprising and incredible. For the cognizance of signs prepares assent, but the explication of causes removes wonder. Which two conduce

* The Latin is "*aliis se venditent.*" Mr. Glassford has, strangely, "*insinuate themselves with others.*"

greatly towards the more easy and mild extirpation of *spectres** from the intellect.

71. The learning which we have has flowed principally from the Greeks. For what things the Roman writers, or the Arabic, or the more recent have added, are† not much, nor of great weight; and, whatsoever they be, are grounded on the platform of what was discovered by the Greeks. But the wisdom of the Greeks was showy, and wasted on disputations, which kind is most adverse to the inquisition of truth. And, therefore, that name of Sophists, which by those who would have themselves be accounted the philosophers, was in way of contempt referred back, and turned against the ancient rhetoricians, Gorgias, Protagoras, Hippias, and Polus, is truly proper to the whole kind; to Plato, Aristotle, Zeno, Epicurus, Theophrastus, and their successors, Chrysippus, Carneades, and the rest. There was but this difference, that the former kind was unsettled and mercenary, strolling round countries, and making show of their wisdom, and exacting a price, but the other, more stated and generous, being such as had their fixed seats, and opened their schools, and philosophized gratis. However, both kinds (though otherwise unlike) were professory, and carried the matter to controversies, and established and fought for certain sects and heresies of philosophy; so that this learning was nearly (what Dionysius not ill scoffed upon Plato) "the talk of idle old men to ignorant young ones." But those more ancient of the Greeks, Empedocles, Anaxagoras, Leucippus, Democritus, Parmenides, Heraclitus, Xenophanes, Philolaus, and the rest, (for Pythagoras we pass over as superstitious,) opened not schools, (that we know,) but betook themselves to the inquiry of truth with greater silence, and more severely and simply; that is, with a lesser affectation and ostentation. And herein was their carriage, too, in our judgment, more commendable, if their works had not, through tract of time, been put out by those lighter, which are more answering and agreeable to the vulgar apprehension and liking; time (like a river) carrying down to us what things are lighter and more blown, and drowning the weightier and solid. Yet neither were they altogether exempt from the vice of the nation and the country; for they leaned too much towards the ambition and vanity of building a sect, and catching the popular breath. But the inquiry of truth is to be set down for desperate when it turns aside to so worthless

* Mr. Glassford has *idols*.

† Mr. Glassford has "what the Roman—is not much."

trifles. Neither is that sentence to be forgotten, or presage rather of the Egyptian priest concerning the Greeks, "that they were ever children, without either antiquity of knowledge, or knowledge of antiquity." And certainly they have that property of children, that they are ready to prate, but unable to generate; for their wisdom seems wordy, and barren of works. The signs, then, taken from the rise and family of the philosophy in use, are not good.

72. Nor are the signs much better which may be taken from the nature of the time and age, than those other from the nature of the place and nation. For the information during that age, whether in regard of time or of the globe, was confined and slender; which is by far the greatest evil, especially for those who rest all upon experience. For neither had they history of a thousand years, which was deserving the name of history, but fables and rumours of antiquity. And of the regions and tracts of the world they had acquaintance with a very little part; calling, without distinction, all the northerns, Scythians; all the westerns, Celts: knew nothing in Africa beyond the hithermost part of Ethiopia; nothing in Asia beyond the Ganges; much less had knowledge of the provinces of the New World even by report, or any certain and constant fame: nay, more, very many climates and zones, where infinite peoples breathe and live, were* by them pronounced for uninhabitable; yea, further, the peregrinations of Democritus, Plato, and Pythagoras, not distant assuredly, but rather suburban, were* voiced as something great. But in our times, both very many parts of the New World, and the extremes on every side of the Old, are come to be well known, and the pile of experiments infinitely grown. Wherefore, if signs are to be taken (after the manner of astrologers) from the time of nativity or birth, nothing great seems to be signified concerning these philosophies.

73. Among signs, none is more certain or noble than that from fruits. For fruits and invented works are, as it were, sponsors and sureties for the truth of philosophy. Now, from those philosophies of the Greeks, and their derivations through particular sciences, for periods now of so many years, hardly one experiment can be adduced which tends to the relief and benefit of man's estate, and may truly be reported as due to the speculations and opinions of philosophy. And Celsus ingenuously and wisely confesses it; namely, that experiments of medicine were found in the first place, and afterwards men

* Mr. Glassford has "are" in both these cases.

philosophized about them, and hunted out and assigned their causes; not falling out by the inverse order, that from philosophy, and a knowledge of causes, the experiments themselves were discovered or fetched. Accordingly, it is not to be wondered, that among the Egyptians (who allowed to the inventors of things divinity and consecration) were more images of brute animals than of men; seeing that brute animals, by natural instincts, have given birth to many discoveries, where men by discourses and conclusions of reason, have exhibited few or none.

The industry of the chemists, indeed, has brought forth some, but, as it were, casually, and in passage; or by somewhat varying their experiments, (as the mechanicians are wont,) not out of any art or theory; for that which they have framed disturbs experiment more than assists. Of those, again, who have been occupied in natural magic, (as they call it), few inventions are found, and these trivial, and nearer to imposture. Wherefore, as it is a caution given* in religion, that faith be shown by works, the same is excellently transferred, likewise, to philosophy; that it be judged by its fruits, and the sterile be counted vain; and the more so if, in place of fruits of the grape and olive, it produces but thistles and thorns of disputations and strife.

Other signs are mentioned in subsequent aphorisms; the want of growth or increase from the received systems of philosophy, the confession of their insufficiency or unproductiveness by their authors and teachers themselves, the great disagreement and dissension among philosophers. Even the supposed unanimous accordance of men with the philosophy of Aristotle Bacon maintains to be fallacious; inasmuch as, first, for ages after Aristotle other systems still had their adherents, till, when all human learning suffered shipwreck in the inundation of the barbarians upon the Roman Empire, only the philosophies of Aristotle and Plato were preserved upon the waves of time, like planks made of a lighter and less solid material; secondly, such general acquiescence as there was, being founded not upon investigation and the convictions of the reason, but upon prejudice and the authority of others, was mere obsequiousness and concurrence rather than unanimity.

* Mr. Glassford has "as it is cautioned."

The subject of the causes of errors in philosophy, and of man's continuance in them for so many ages, is now taken up, and is considered in the fifteen aphorisms from the 78th to the 92nd inclusive. First, out of twenty-five centuries which might be reckoned to have elapsed since the commencement of civilization, scarcely six could be selected as having been times in which learning flourished. Secondly, even in those times, natural philosophy, which must be accounted the great mother of the sciences, had obtained a very small part of the attention and the labours of men. In modern times theology, in the Greek and Roman times ethics and politics, had been the chief subjects of study. Those, besides, who did apply themselves to natural philosophy had seldom given themselves up to it exclusively, or made it a principal object. It had been rather made a passage and bridge to other things; and that great mother of the sciences, by an amazing indignity, had been thrust down to the offices of a hand-maid, to attend upon the operations of medicine or mathematics. Another powerful cause had been that the true goal or ultimate object of science had never been properly fixed. That goal is nothing else than that human life may be endowed with new inventions and riches; but the use commonly made of philosophy had hitherto been merely to convert it to a professorial purpose (to the embellishment of a lecture), or to the gain or reputation of the individual cultivator. And, if men had not rightly fixed their goal, still less had they rightly chosen their way or method of scientific investigation. The method commonly followed had been for any one who applied himself to the work of discovery first to inquire and find out whatever had been said about the matter by others; then to add his own meditation upon it, and by much mental agitation to solicit and, as it were, invoke his own spirit to declare to him its oracles; all which was a proceeding entirely without foundation, and turning only upon opinions. Another perhaps might call in logic to his assistance; but what is called invention in logic is not of principles and leading axioms, upon which the arts are established, but only of things that seem agreeable to such principles

or axioms. And as for the experience of which some had availed themselves—denominated chance when merely fallen in with, experiment when sought out—it had been nothing but a loose broom (*scopae dissolutae*), so to speak, and a mere groping such as men take to in the night, trying everything if perchance they may discover the right road; whereas it would be much better and wiser either to wait for day, or to kindle a light and then to proceed on their way. The true order of experience first kindles a light, and then by that light shows the way, beginning with an orderly and well digested, not a preposterous or erratic course of experimenting, and thence educating axioms, and again from the established axioms new experiments, seeing that not even the divine word operated upon the mass of things without order.

Another source of mischief had been the opinion, or inveterate, though empty and pernicious, imagination, that the dignity of the human mind is lowered by its being long and much engaged with experiments and particular facts, which are subjected to the senses and confined to matter. And then follow the 84th and 85th Aphorisms, which Mr. Glassford thus translates:—

84. Again, men have been stayed and almost enchanted from a progress in knowledge by a reverence of antiquity, and the authority of men who are of great account in philosophy, and in consequent consent with them. And of consent we have spoken above.

But for antiquity, the opinion which men cherish concerning it is altogether negligent, and scarcely congruous even to the name. For the old age and grandevity of the world are to be truly counted as antiquity; which are properly to be ascribed to our times, not to the younger age of the world, such as it was with the ancients. Since that age, in respect to us, indeed, is ancient * and greater, but in respect to the world itself was new and lesser. And, in reality, as we look for a greater acquaintance with human affairs, and a more mature judgment, † from an old than from a young man, on account of his experience, ‡

* Mr. Glassford has "is, in respect to us, indeed, ancient."

† Mr. Glassford has "maturity of judgment."

‡ Mr. Glassford has "of experience."

and the variety and abundance of the things which he has seen, and heard, and considered, just so it is fit, also, that much greater things be expected from our age (if it knew its strength, and would endeavour and apply) than from the old times; as being a more advanced age of the world, and enlarged and accumulate with numberless experience and observations.

Neither is it to be accounted for nothing, that, through distant navigations and peregrinations (which in our times have become so frequent), very many things in nature have been laid open and discovered, by which new light may be cast upon philosophy. Nay, it would be disgraceful to men, if tracts of the material globes (that is, of countries, and seas, and stars) were in our times immeasurably disclosed and illustrated, but* the boundaries of the intellectual globe were confined within the discoveries and straits of the ancients.†

Then, as touching authorities, it is the greatest pusillanimity to defer infinitely to authors, and yet from Time, the author of these, and so of all authority, to withhold his due. For Truth is rightly said to be the daughter of Time, not of authority. Thus it is no wonder if these spells of antiquity, authority, and consent have so tied the faculties of men, that (like those maleficate and bewitched) they may not hold converse with things themselves.

85. Nor is it only the admiration of antiquity, and authority, and agreement, which has constrained the industry of men to rest in what has been already discovered, but an admiration also of the works themselves which have already been furnished in abundance to mankind. For if any shall bring under his review the variety of things, and that most beautiful apparatus which by the mechanic arts has been collected and introduced for man's use and adornment, he will certainly incline coming over to an admiration rather of the wealth of humanity ‡ than to a sense of its poverty; not at all adverting, that the earliest observations of man, and works of nature (which are like the soul and first motive to all that variety), are neither many, nor drawn from any depth; all the rest belonging § only to men's perseverance, and the subtile and ordered motion of the hand or of

* Mr. Glassford has "yet."

† Mr. Glassford has "of the old" (with what intended meaning we do not understand). The Latin (*veterum*) is quite clear.

‡ Mr. Glassford has "of human wealth."

§ *Pertinere*.—Mr. Glassford has "having relation."

instruments. Thus (for an example) the making of horologies * is truly a subtle and accurate thing, such, namely, as in its wheels appears to copy the celestials, in its successive and regulated movement the pulse of animals; which thing yet wholly depends on one or two axioms † of nature.

And, again, if one contemplates that subtilty which belongs to the liberal arts, or should even look to that which regards the preparation of natural bodies by the mechanic arts, and other such things; ‡ as the discovery of the celestial motions in astronomy; of concords in music; of the letters of the alphabet § in grammar (which even yet are not used in the kingdom of the Chinese); or again, in mechanics, || of the works of Bacchus and Ceres, that is the preparation of wine and beer, the making of breads, or even the delicacies of the table, and distillations, and the like; if he also considers with himself, and turns in his mind, through what revolutions of times these things have been advanced to the culture in which we now have them (for these all are ancient except distillation); and (as already noted of horologies) how little they hold of observations and axioms of nature, and how easily, and as it were by occasions presented, and incidental ¶ observations, these might be discovered; he will (I say) readily throw off all wonder, and rather compassionate the human condition, that for so many ages there should have been such a penury and barrenness of things and inventions. And yet these very inventions, of which we now made mention, were ancienter than philosophy and the intellectual arts; so much (if the truth must be spoken), that, when these reasonings and dogmatical learnings came in, the invention of useful works ended.

Or if any one should turn from the workshops to the libraries, and hold in admiration the immense variety which we see of books; when he has examined, and looked more into the matters and contents of the books themselves, he will assuredly be filled with an opposite amazement: and after he shall have

* Mr. Glassford here inserts "clocks and other," for which there is nothing in the Latin.

† *Ex uno aut altero naturae axiome.* Mr. Glassford has "on one or another axiom."

‡ Mr. Glassford has "other such."

§ Mr. Glassford has "the alphabet letters."

|| Mr. Glassford has "mechanicals."

¶ *Incurrentes.*—Mr. Glassford has "concurrent."

seen how endless are the repetitions, and that men act and speak still the same things, he will pass from admiration of the variety to astonishment at the indigence and paucity of those things which have hitherto detained and occupied the intellects of men.

Or, if one shall let down his mind to the contemplation of what things are esteemed rather curious than sound, and shall look more inwardly to the works of the alchemists or magicians, he will doubt perhaps whether they are more deserving of laughter or of tears. For the alchemist nurses an eternal hope, and, when the affair succeeds not, impeaches rather his own mistakes, revolving in self-accusation how he has not sufficiently understood the terms either of the art,* or of the authors, and therefore applies his mind to traditions and auricular whispers; or that he has tripped something in scruples and moments of his practice, and therefore repeats his experiments without end; and meanwhile, as among the dies of experiment he lights upon some, either new in their very feature, or for some usefulness not to be slighted, with such pledges he feeds his mind, and these he most upholds and celebrates; the rest he keeps alive by hope. And yet it is not to be denied that the alchemists have discovered not a few things, and endowed men with profitable inventions. However, that fable squares not ill with them, of the old man who left to his sons gold buried under ground in his vineyard (but pretending ignorance of the spot); wherefore they diligently applied themselves in digging the vineyard, and no gold indeed was found, but the vintage was made richer by the culture.

But the cultivators of natural magic, who explain everything † by sympathies and antipathies of things, have, through idle and most supine conjectures, affixed to things wonderful virtues and operations; and if they have, at any time, exhibited works, they are such as suit to admiration and novelty, not to fruit and usefulness.

Again, in the superstitious magic (if we must speak even of this), it is to be specially observed ‡ that the subjects are of some fixed and determined sort only, in which the curious and superstitious arts, throughout all nations and ages and even religions, have had any power or have amused them-

* Mr. Glassford has "either not . . . the terms of the art."

† Mr. Glassford has "rid all."

‡ "Adverted" is Mr. Glassford's word.

themselves.* Let these accordingly be dismissed. Meantime, it is nothing strange if opinion of plenty has been a reason of scarceness.

The improvement of philosophy, the author goes on to argue, had been further prevented by the craft of the professors and teachers of the sciences, who, by the mere show of an all-comprehensive arrangement and system of divisions, had been accustomed to hold them forth as already perfected and carried out to the utmost possible completeness. The first investigators of truth, on the contrary, had been contented to throw the knowledge they gained from the contemplation of nature into aphorisms, or brief, unconnected sentences, and never pretended to embrace an entire art. Then, still further to confirm the ascendancy of the ancient systems, there had been the variety and levity of many of their opponents, the proposers of new methods or theories; the empty and fantastic boasters who had loaded mankind with promises of the prolongation of life, the retardation of old age, the alleviation of pain, the reparation of natural defects, the deception of the senses, the restraint and excitement of the passions, the illumination and exaltation of the intellectual faculties, the transmutation of substances, the augmentation to any degree of the force and velocity of motion, the effecting of impressions upon and changes of the air, the deduction and appropriation of celestial influences, the divination of the future, the exhibition of the distant, the revelation of the hidden, and many more such things. Still more had men been kept back from the discovery of real and great truths by their own pusillanimity, and the smallness and insignificance of the tasks or objects which they had been wont to propose to themselves in the cultivation of the sciences. The consequence of this had been, that the weakness of the arts had been turned into a calumny upon nature;

* Mr. Glassford has "have exercised any influence or delusion." But, besides that to exercise a delusion is hardly English, that is not the meaning of the Latin, "in quibus—aliquid potuerint aut luserint."

and whatever human skill had failed in accomplishing had been pronounced to be impossible. If enquirers, instead of each confining his attention to one particular art, had extended their examination throughout the general realm of nature, they would have found that what was obscure in one department was manifest and familiar in another. Another impediment to the progress of natural philosophy in every age had been superstition, and a blind and immoderate zeal for religion. Even in his own day, Bacon complains, the discussion of the facts and laws of nature had been made more difficult and perilous by the summaries and methods of the scholastic theologians, who, after having reduced divinity, as far as they could, into order and the form of an art, had mingled with the body of religious truth much more than was necessary of the pugnacious and thorny philosophy of Aristotle. Others, again, though in a different way, had done equal injury to both Christianity and philosophy by attempting to deduce and confirm the truths of religion out of the principles and the authority of philosophers. The various ways in which almost all access to philosophy was intercepted by the ignorance of divines are thus enumerated. Some were afraid that an inquisition into nature might penetrate beyond the established bounds of sobriety. Others thought that, if intermediate or secondary causes remained unknown, every thing would be more readily referred (as they conceived religion required) to the actual hand and directing wand of God; which, says Bacon, is nothing else than to wish to gratify God with a lie.* Others were afraid lest movement and change, once begun, in philosophy, should pass thence to religion. Others finally seemed to be anxious lest something should be found in the investigation of nature which might subvert or at least shake

* In the original, "quam Deo per mendacium gratificari velle." Mr. Wood erroneously translates, "that God wishes to be gratified by means of falsehood." Nor does his rendering of the next sentence give exactly Bacon's meaning;—"but motion and change in philosophy should terminate in an attack upon religion."

religion, especially among the unlearned. But these two last apprehensions, Bacon declares, seem to him to savour wholly of animal wisdom, as if men in the recesses and secret thoughts of their minds were really diffident and doubtful about the strength of religion and the dominion of faith over the senses. He who truly considers the matter will perceive that natural philosophy is, after the word of God, the surest medicine against superstition, and the best minister of faith. The 90th aphorism, as translated by Mr. Wood, is as follows :—

90. Again, in the habits and regulations of schools, universities, and the like assemblies, destined for the abode of learned men, and the improvement of learning, everything is found to be opposed to the progress of the sciences. For the lectures and exercises are so ordered, that anything out of the common track can scarcely enter the thoughts and contemplations of the mind. If, however, one or two have perhaps dared to use their liberty, they can only impose the labour on themselves, without deriving any advantage from the association of others : and if they put up with this, they will find their industry and spirit of no slight disadvantage to them in making their fortune. For the pursuits of men in such situations are, as it were, chained down to the writings of particular authors, and if any one dare to dissent from them, he is immediately attacked as a turbulent and revolutionary spirit. Yet how great is the difference between civil matters and the arts ; for there is not the same danger from new activity and new light. In civil matters even a change for the better is suspected on account of the commotion it occasions : for civil government is supported by authority, unanimity, fame, and public opinion, and not by demonstration. In the arts and sciences, on the contrary, every department should resound, as in mines, with new works and advances. And this is the rational, though not the actual, view of the case : for that administration and government of science we have spoken of is wont too rigorously to repress its growth.

In the 91st aphorism the want of proper rewards for the cultivation of science is complained of. And here is the 92nd, also in Mr. Wood's version :—

92. But by far the greatest obstacle to the advancement of

the sciences and the undertaking of any new attempt or department is to be found in men's despair and the idea of impossibility. For men of a prudent and exact turn of thought, are altogether diffident in matters of this nature, considering the obscurity of nature, the shortness of life, the deception of the senses, and weakness of the judgment. They think therefore that in the revolutions of ages and of the world there are certain floods and ebbs of the sciences, and that they grow and flourish at one time and wither and fall off at another, that, when they have attained a certain degree and condition, they can proceed no further.

If therefore any one believe or promise greater things, they impute it to an uncurbed and immature mind, and imagine that such efforts begin pleasantly, then become laborious, and end in confusion. And, since such thoughts easily enter the minds of men of dignity and excellent judgment, we must really take heed lest we should be captivated by our affection for an excellent and most beautiful object, and relax or diminish the severity of our judgment; and we must diligently examine what gleam of hope shines upon us, and in what direction it manifests itself, so that banishing her lighter dreams we may discuss and weigh whatever appears of more sound importance. We must consult the prudence of ordinary life too, which is diffident upon principle,* and in all human matters augurs the worst. Let us then speak of hope, especially as we are not vain promisers, nor are willing to force or ensnare men's judgment, but would rather lead them willingly forward. And, although we shall employ the most cogent means of enforcing hope when we bring them to particulars, and especially those which are digested and arranged in our Tables of Invention, (the subject partly of the Second but principally of the Fourth Part of the Instauration), which are indeed rather the very object of our hopes than hope itself; yet to proceed more leniently we must treat of the preparation of men's minds, of which the manifestation of hope forms no slight part. For without it all that we have said tends rather to produce a gloom than to encourage activity or quicken the industry of experiment, by causing them to have a worse and more contemptuous opinion of things as they are than they now entertain, and to perceive and feel more thoroughly their unfortunate condition. We must therefore disclose and prefix our reasons

* Rather upon rule. The Latin is "*ex praescripto*."

fer not thinking the hope of success improbable; as Columbus before his wonderful voyage over the Atlantic gave the reasons of his conviction that new lands and continents might be discovered besides those already known. And these reasons, though at first rejected, were yet proved by subsequent experience, and were the causes and beginnings of the greatest events.

~~The exposition of the grounds of hope for the future progress of philosophy occupies a number of subsequent aphorisms. Some religious considerations are first suggested:—as, that God is the author of good and the father of light; that, as it is said in regard to spiritual things that the kingdom of heaven cometh not with observation, so in every more considerable work of providence progress is made imperceptibly, and from the smallest beginnings; and that the prophet Daniel has declared that in the last days of the world many shall run to and fro and knowledge shall be increased. It is then remarked that even the errors and failures of the past afford hope for the future and encouragement for the trial of methods as yet unattempted. So Demosthenes argued, in his famous exhortation to the Athenians, that that which was worst in the past, their ill management of the war with Philip and their consequent misfortunes, was the very thing which chiefly entitled them to expect better success in the time to come, when they should have changed their system and corrected their errors. This remark introduces a more distinct or precise statement of the wrong courses that had been hitherto taken in the study of philosophy. Here is the 95th aphorism, as it is given by Shaw:—~~

95. Those who have treated the sciences were either empirics or rationalists. The empirics, like ants, only lay up stores, and use them; the rationalists, like spiders, spin webs out of themselves; but the bee takes a middle course, gathering her matter from the flowers of the field and garden, and digesting and preparing it by her native powers. In like manner, that is the true office and work of philosophy, which, not trusting too much to the faculties of the mind, does not lay up the matter, afforded by natural history and mechanical experience, entire or unfashioned in the memory, but treasures it after being first elab-

borated and digested in the understanding. And, therefore, we have a good ground of hope, from the close and strict union of the experimental and rational faculty, which have not hitherto been united.

In the 96th aphorism it is observed that natural philosophy has never yet been found simple and pure, but always infected and corrupted by some foreign intermixture; as in the school of Aristotle by logic, that of the later Platonists by mathematics. In the 97th it is added that no one has yet been found of sufficient constancy and firmness of mind to determine altogether to throw away common theories and notions, and to apply his understanding afresh to the examination of particular facts when it has been thus smoothed and made even. As Livy says of Alexander the Great that all he had done was only that he had judiciously dared to despise imaginary difficulties, so Bacon conceives that future times will say of him that he had achieved nothing very great, but had only looked upon some obstacles of small account which were usually regarded as formidable. The 98th aphorism, as translated by Shaw, is as follows:—

And for the foundations of experience, which is the next thing we must proceed to, they either have not hitherto been laid, or very weakly. Nor has a collection of materials, competent either in number, kind, or certainty, for informing the understanding, or any way sufficient, and worthy of the end proposed, been hitherto made; but, on the contrary, learned men, after an easy, indolent manner, have received certain rumours of experience, and the popular reports and tales thereof, both for building and strengthening their philosophy, and given them the weight of strong testimonials; which is just as if a kingdom should govern itself, not according to the advices and intelligences of its ambassadors, and trusty officers in foreign courts, but by the idle rumours and common town-talk of its people. For as to matter of experience, there is nothing hitherto well discovered, verified, adjusted, weighed, or measured in natural history, but whatever is undefined and vague in observation must needs be fallacious and deceitful in the information. And if this shall seem surprising, or the complaint appear unjust to any one, whilst so great a philosopher as Aristotle, assisted with the purse of so great a prince as Alex-

ander, has compiled such an exact history of animals; and whilst some others, with greater diligence, though with less bustle, have contributed many things thereto; and whilst others again have written copious histories, and accounts of plants, metals, and fossils, he does not seem sufficiently to understand our meaning. A natural history, compiled for its own sake, is one thing; and a natural history, collected for informing the understanding, in order to the building up of natural philosophy, is another. And these two histories, as they differ in other respects, so principally in this, that the former contains various descriptions of natural bodies, but not experiments of mechanic arts. For as, in civil life, the temper of a man, and the secret dispositions of his mind and affections, are better understood, when he is ruffled, than otherwise; so the secrets of nature are better got out by the torturing of arts, than when suffered to take their own course. And, therefore, we may then have good hopes of natural philosophy, when natural history, which is the basis thereof, shall be better supplied, and not before.

Even in the plenty of mechanical experiments, Bacon proceeds to observe, there is a great scarcity of such as most help to inform the understanding; the mechanic seldom applying his mind or his hand to any other things than those which are of service to his work. Then only, he thinks, may a hope be reasonably entertained of the further progress of the sciences when there shall be collected into a natural history many experiments which are of no use in themselves, but contribute only to the discovery of causes and axioms, experiments which he is accustomed to call *light-bearing*, in contradistinction to others which may be called *fruit-bearing*. A different method, order, and manner of process must also be introduced. Then the experiments must be carefully recorded; and arranged tables must be formed of all observed facts appertaining to the subject of investigation. But even after this has been done the mind must not pass immediately to the inquisition or discovery of new particulars or effects; results of any importance are only to be looked for from the new light of axioms, deduced by a certain method and rule from the particulars first collected, and then employed to indicate and

mark out new particulars. Nor must the mind leap and fly at once from particulars to the ~~most general axioms~~, such as ~~what are called the principles of arts and of things~~. Then only can there be hope for the sciences when, ~~by a true ladder, and steps not intermitted or broken off from one another but continuous~~, an assent shall ~~be made from particulars to minor axioms, thence to intermediate, one rising above another, thence lastly to the most general.~~ It is the intermediate that are the true, solid, and living axioms, upon which the affairs and the fortunes of the human race rest. It is not wings, but rather lead and weights (*"non plumæ, sed plumbum potius et pondera"*), that the human understanding wants; something to restrain its tendency to leap and fly at once from particular facts to universal principles. In establishing axioms a form of induction different from that heretofore in use must be employed; an induction which shall separate nature by means of proper rejections and exclusions, and then shall after a sufficient number of negatives arrive at its affirmative conclusions. And men must avail themselves of the aid of this kind of induction, not only for the discovery of axioms, but for the definition of notions or conceptions. Every axiom thus obtained must be considered in reference to whether it is fitted only for those particular facts from which it is abstracted, or whether it be of greater extent and generality. And, as has been before said, in order to permit any hope of progress, all separation and dismemberment of the sciences must be prevented by the extension of natural philosophy, and the reduction of particular sciences to that one.

Besides these grounds of hope for the future, derived even from the errors and failures of the past, it is also to be considered that, if many useful things have been found out by men as it were by chance, when they were not seeking for them but were engaged about other matters, many more such must surely be discovered when they shall expressly apply themselves to the search, and shall prosecute it after a certain method and order, not accidentally and on the mere impulse of the moment. The

following is the 109th aphorism, as translated by Mr. Glassford :—

109. Even that, likewise, may be drawn into matter of hope,* that, of the very things which have already been discovered, some are of such a kind, that before they were discovered it would not easily have come into the mind of any one to suspect aught concerning them ; but one should at once have contemned them as plainly impossible. For men are used to prognosticate of new things after the pattern of the old, and according to an imagination prejudiced and tinctured by them ; which kind of anticipation is most deceitful, since much of what is derived from the fountains of things flows not in the accustomed rills.

As if, before the discovery of cannon, one should have described the thing by its effects, and talked of it after this manner ; that a certain invention had been disclosed, by which walls and the strongest fortresses might, from a long reach, be shaken and cast down ; undoubtedly men would † have set themselves to meditate much and variously about the powers of engines and mechanic contrivances, to be multiplied by weights and wheels, and such like arietations, and impulses ; but of inflamed air, so suddenly and violently expanding itself, and blowing forth, scarcely any thing would ever have occurred to the imagination or conceit of any one ; being a thing he saw no example of at hand, save, perhaps, in earthquakes or thunder, which, as *magnalia* (or greater works) of nature, and not imitable by man, men would straightway have rejected.

In the same way if, before discovery of the silk yarn, some one should have thrown out language of this sort ; that a certain kind of thread was discovered, for use of garments and furniture, which far exceeded linen or woollen thread in fineness, and, nevertheless, in tenacity, and in beauty too, and softness ; men would † have straight imagined something about a species of vegetable cotton, or about the more delicate piles of some animal, or about feathers and down of birds ; but of the spinings of a puny worm, and these so copious, and self-renewed, and annual, assuredly they would have conjectured nothing. Nay, if one had even dropped a word concerning a worm, doubtless he had been mocked as a dreamer, who dreamed new labours of the spider.

* Mr. Glassford has "drawn to hope."

† Mr. Glassford has "should."

In like manner, if, before discovery of the mariner's needle, some one should have broached a discourse of this nature; that a certain instrument was invented, by which the poles and points of the heavens might be accurately taken and discerned; men would* immediately, through the workings of fancy, have pursued many and diverse cogitations regarding the more exquisite construction of astronomical instruments; but that anything could have been found whose motion should so well sort with the celestials, and yet itself should not be of the celestials, but a stony or metallic substance merely, would have appeared utterly incredible. And yet these, and like things, did escape the notice of men through so many ages of the world, and have been discovered, not by philosophy or art and skill of reasoning, but through some fortuitous and favouring occurrence; and are, as we said before, of such a kind as are plainly heterogeneous, and the most remote from things antecedently known, so that no preconceit could at all, or in any way, have led to them.

There is all reason, therefore, to hope, that in the lap of nature are many things of excellent use still hidden, which have no kindred or parallelism with those hitherto discovered, but are altogether placed without the roads of the fancy; which, in any case, are yet undiscovered; which, beyond doubt, in many turns and circuits of ages, will sometime also themselves come forth, as those former did come; but, by the way which we now treat, may speedily, and suddenly, and together, be presented to the view, and anticipated.

~~There are some other inventions. Bacon then observes, which are of such a kind as to show that men may pass by or step over the noblest discoveries, even when lying as it were at their feet; and he gives as an instance the art of printing. At first it seems incredible to us that a particular thing should ever be found out; and then, after it has been found out, equally incredible that it should have so long remained undiscovered.~~

Let men consider, too, what infinite expenditure of talent, time, and means they bestow upon things and studies of comparatively little use and value; a very small part of which, if it were directed to what is sound and solid, would overcome any difficulty. And in the

* Mr. Glassford has "should."

mean time let no one be scared by the multitude of particular facts, but rather take encouragement from that very circumstance, seeing that the particular phenomena of the arts and of nature are a mere handful compared to the fictions of the imagination, disjoined and abstracted from the evidence of things. If we had but any one at hand, says Bacon, who would answer our interrogations respecting the realities of nature,* the discovery of all causes and of all sciences would be the work of only a few years. And then he brings forward his own example in the 113th aphorism, which may be literally translated thus :—

We even think that something of hope may be supplied to man from our own example; nor do we say this in the spirit of boasting, but because it may be useful to say it. If any be distrustful, let them consider me, a man, among the men of my age, the most occupied with civil affairs, of somewhat infirm health (which occasions much loss of time), and in this matter clearly a first adventurer, following the steps of no other, nor even holding communication respecting these things with any mortal; and who yet, having entered firmly upon the true road, and submitting my understanding to things, have, as I conceive, carried forward these things somewhat; and then let them consider what may be expected, after these indications of ours, from men abounding in leisure, and from associated labours, and from a succession of ages; especially in a road, which is not pervious only to single travellers (as is the case with that logical way), but where men's labours and works (especially in so far as regards the collecting of experience) may be in the best manner both distributed and afterwards combined. For then will men begin to know their strength, when not infinite numbers shall undertake the same thing, but some one thing and some another.

Finally, he urges, even if the breeze of hope breathing from *that new continent* were much fainter and more doubtful than it is, it would be the wiser and in every way the better course to make the trial. The gain of

* This, we apprehend, must be the meaning of "*qui de facto naturae ad interrogata responderet*;" not "*who could actually answer our interrogations of nature*," as Mr. Wood translates the passage.

trying might be a great good; the result of failure would only be the loss of a little human labour.

Here then he closes what he calls the demolishing part (*pars destruens*) of the *Instauration*, consisting of three confutations; the confutation of the natural human reason when left to itself; of the established mode of demonstration; and of the received theories or philosophical systems. One thing only remains to be done, before proceeding to expound the true art and rule of interpreting nature. The purpose of this First Book is to prepare the minds of men for understanding as well as for admitting what is to follow; accordingly, the surface of the mind having been now cleansed, and polished, and made even, the mind ought next to be placed in a good position, and, as it were, in a benevolent aspect, in regard to the truths that are to be proposed for its acceptance. The remaining aphorisms, therefore, from the 116th inclusive to the 130th or last, are employed by Bacon in prepossessing the reader with a favourable opinion of the new method of philosophy, although, as he expresses it, only for the mean time, and by way of interest, until the thing itself be explained.

He begins by disclaiming any design or desire of founding a sect, or even of proposing any particular systematic view of nature, although upon some particular points he conceives that he holds truer, more certain, and more productive opinions than those commonly entertained, as may appear from what will be found collected in the Fifth Book of the *Instauration*. He does not think that the time is yet arrived for any universal theory; and he has no hope even of being able to complete the Sixth and last Part of the Instauration (which is intended for the exposition of a philosophy discovered by means of the legitimate interpretation of nature). His purpose is solely to try whether he cannot establish the power and greatness of men upon a firmer foundation, and extend the boundaries of their sway; and for the present he will be satisfied if he can only sow the seeds of a purer truth for posterity, and make a commencement of the great work.

Neither does he offer or promise particular effects; although in his Tables of Invention (forming the Fourth Part of the *Instauration*), and also in many particular instances (brought forward in the Second Part), and above all in his observations on the history of nature (in the Third Part), many indications and designations of noble effects may be noted by any one of ordinary perspicuity and skill. But his main purpose is, as he has repeatedly declared, to extract, not effects from effects, or experiments from experiments (as the empirics do), but from effects and experiments causes and axioms, and from causes and axioms new effects and experiments, in his character of a legitimate interpreter of nature. And thus, he adds, contending for greater things, he condemns all hasty and premature delay upon particular experiments, however promising, as (to use a favourite illustration of his) a running after the apples of Atalanta. He does not childishly aspire after golden apples, but bends all his efforts to make the course of art victorious over nature;* nor is he in haste to reap moss or the green blade, but is contented to wait for the harvest in its due season.

~~Carefully as his natural history and tables of invention have been compiled, he admits that some things insufficiently ascertained, and other things quite false, may possibly be found in them; but this is of no more consequence than is the wrong placing of a letter here and there in writing or printing. Nor is it any reasonable objection, but the contrary, that many things in the history and the experiments may be, some light and common, some mean and illiberal, some subtile and merely speculative, and, as it were, of no use. Important truths are often to be gathered from the commonest facts; and even the meanest things are, as much as the loftiest and most splendid, a portion of the universe. The following is the 121st Aphorism, as Mr. Glassford has translated it:—~~

* In the original—"Sed omnia in victoria cursus artis super naturam ponimus." But the expression seems awkward and harsh, and perhaps some misprint may be suspected.

121. But the next objection* is, on all accounts, to be looked into more closely : that many things in our history will, to the vulgar apprehension, or indeed to any intellect accustomed to present things, appear of a somewhat curious and unprofitable subtlety. Of this, therefore, first and chiefly, we both have spoken, and are to speak. And we do so in this manner : † that as yet, in the beginning, and for a long time, we are seeking experiments of *light* only, not experiments of fruit ; after the example, as we have frequently remarked, of the divine creation, which, on the first day, produced the light only, and allotted one entire day to that alone, nor on that day mixed aught of *materiate* work.

Therefore, if any should consider such things to be of no use, let him think it to be the same as if he judged also that there is not any use of the light, because, indeed, it is not a solid or *materiate* substance. And we hesitate not to say, that knowledge of simple natures, if it be well examined and defined, is truly as the light, giving entrance to the universal recesses of works, and, with a sort of power and efficacy, embracing and drawing after it whole bands and troops of works, and opening the fountains of the noblest axioms ; yet in itself is that knowledge of no considerable use. Nay, even the elements of letters, by themselves and separately, signify nothing, and have not any use, yet are they like the first materials ‡ for composition and garniture of all discourse. Yea, the seeds of natural things, powerful in their possible virtue, as to use (except in their growth §) are nothing ; and the dispersed rays of the light itself, unless they concur, impart not their benefit.

But if any be offended || by subtleties of speculation, what shall we have to say of the schoolmen who have indulged in subtleties without measure ? Which subtleties, too, were wasted on words, or, at least, on vulgar notions (which is the same), not on things or nature ; and without profit not only in their beginnings, but even in their consequences ; not being such as have for the present perhaps no utility, but consequentially an infinite, like those we speak of. But of this let men be assured, that all subtlety of disputations and reasonings, if

* Mr. Glassford has "the next is."

† Mr. Glassford has "are to speak, in this manner."

‡ Mr. Glassford has "the *materia prima* (or rudiment)."

§ Mr. Glassford has "by their process."

|| Mr. Glassford has "take offence."

it be employed only after invention of axioms, is late and out of place; and that the true and proper, or at least chief time for subtlety, is in the balancing of experiment, and the constitution of axioms therefrom. For that other subtlety solicits * and catches at nature, but never apprehends or takes hold of her. And that is undoubtedly most true, if transferred to nature, which they use to say of occasion or fortune, "that she offers a lock in front, but behind she is bald."

Finally, as touching this contempt, in natural history, of things either vulgar or base, or over-subtle, and in their beginnings unprofitable, let that speech of the poor woman to a sworn prince, who would have thrown aside her petition as something unworthy and beneath his majesty, be taken for an oracle, "Do you then give over to be a king." For it is most certain that the command over nature may neither be acquired nor maintained, if one will not be at leisure for things of this kind, as seeming too small and trifling.

Another objection is then answered:—that it is a strange and harsh proceeding to put away all sciences and all authorities in a mass, and to strike them off as it were at one blow; no aid nor support being sought from the ancients. It would not have been difficult, Bacon observes, if he had chosen to act with less sincerity, for him to have referred for the origin and sanction of his doctrines either to the early ages before the times of the Greeks (when the sciences relating to nature flourished more perhaps,† though in greater silence, and had not yet fallen into the trumpets and fifes of the Greeks), or even (in some particulars at least) to some of the Greeks themselves. But, trusting to the evidence of facts, he rejects every form of fiction and imposture. The discovery of things is to be sought from the light of nature, not demanded back from the darkness of antiquity. And the universal reprehension which he has directed against the existing philosophy is,

* Mr. Glassford has "desires." The Latin is *prensat*.

† The Latin is:—"Cum scientiæ de natura magis fortasse, sed tamen majore cum silentio, floruerint." Mr. Wood translates (erroneously, we apprehend); "Since the sciences in all probability flourished more in their natural state, though silently."

he contends, really more modest than any partial censure would have been; for it implies that men had rather, misled by erroneous principles of speculation, neglected and passed over facts, than formed a false judgment respecting them. Then he proceeds, as the passage is rendered by Mr. Wood:—

With regard to our presumption, we allow that, if we were to assume a power of drawing a more perfect straight line or circle than any one else by superior steadiness of hand or acuteness of eye, it would lead to a comparison of talent; but, if one merely assert that he can draw a more perfect line or circle with a ruler or compasses than another can by his unassisted hand or eye, he surely cannot be said to boast of much. Now this applies not only to our first original attempt, but also to those who shall hereafter apply themselves to the pursuit. For our method of discovering the sciences almost * levels men's wits, and leaves but little to their superiority, since it achieves everything by the most certain rules and demonstrations. Whence (as we have often observed) our attempt is to be attributed to fortune rather than talent, and is the offspring of time rather than of wit. For a certain sort of chance has no less effect upon our thoughts than on our acts and deeds.

But still another objection may be made:—that the new method sins in the very way in which it charges other systems with being erroneous and defective, namely, in not establishing the true and best goal and aim of the sciences; that the contemplation of truth is more dignified and lofty than any utility or greatness of actual effects, and that this long and anxious dwelling upon experience and matter, and the fluctuations of particular facts, must fasten the mind to the ground, or rather throw it down into a Tartarus of confusion and perturbation. With this reasoning Bacon professes to agree; but he says that his object is simply to establish in the human understanding a true model of the universe, which can only be done by a diligent dissection and anatomy of nature.

Again, it may be said that he is only doing over again what has been already done; that the ancients, after all, followed the very method which he proposes. He

* Mr. Wood has "merely." The Latin is *ferè*.

admits that the ancients probably did collect facts and note them down ; but still he contends that their method of deducing general principles was plainly altogether different from his. Their custom was, from certain instances and particulars, with the addition of common notions, and perhaps something taken from such of the received opinions as had the greatest currency, to fly at once to the most general conclusions, or to the principles of the sciences ; according to the fixed and immoveable truth of which they then deduced and proved inferior conclusions by means of intermediate propositions ; while, if any new instances were brought forward which contradicted their dogmas, they subtly reduced them into conformity by distinctions, or by explanations of their rules, or got rid of them in some clumsy way by means of exceptions ; but at any rate laboriously and pertinaciously accommodated to those their principles the causes of all such particular facts as were not manifestly repugnant to them.

In the next aphorism he ~~defends himself against the charge of encouraging scepticism by his demand of a suspension of judgment till general principles have been arrived at by the proper steps ; asserting that his object is not to destroy certainty of conviction, but only to produce a wise certainty (non acatalepsiam, sed eucatalepsiam meditatur et proponimus.)~~ In the 127th he declares that his method is intended for the perfecting, not of natural philosophy alone, but equally of all the other sciences, logical, ethical, and political. In the 128th he repeats his assurance that he has no wish to destroy the philosophy, arts, and sciences in common use ; appealing to his other writings, and especially his books on the Advancement of Learning, in proof of his good will and friendly disposition towards all the established forms and customary applications of scholarship. And this is the 129th, to avail ourselves once more of Mr. Glassford's version :—

129. It remains that we say a few things concerning the excellency of the end. These, if they had been mentioned

before, might have seemed no better than wishes; but, hope being now raised, and unjust prejudices removed, * may chance to have greater weight. And if we had perfected and fully discharged our task, and were not proceeding to call others to a partnership and union† of labours, we should still have abstained from speech of this kind lest it should be taken for a publishing of our deserts. But since the industry of others is to be sharpened, and their minds provoked and kindled, some things it is convenient to recall to men's recollection.

First, then, the introduction of noble inventions appears to hold by far the foremost place among human actions; and so the early ages determined. For to the inventors of things they ascribed divine honours; but to those who deserved well ‡ in civil matters (such as founders of cities and empires, lawgivers, deliverers of their countries from long calamities, subverters of tyrannies, and others like to these), they adjudged the honours of heroes only. And certainly, if one compares them rightly, he will find this judgment of the old age to be just. For the benefits of inventions may belong to the whole human race, the civil exclusively to certain seats of men; these, again, endure not beyond a few generations; those, as it were, through perpetual times. And the amendments of civil estate proceed, for the most part, not without force and disturbance; but inventions bless and convey their advantages without the hurt or sadness of any one.

Besides, inventions are in a manner new creations, and somehow imitative of the Divine works; as he well sung:—

*Primum frugiferos fœtus mortalibus ægris
Dididerant quondam præstanti nomine Athenæ;
Et recreaverunt vitam, legesque rogarunt.*

(Athens, that name renowned, the first gave birth
To fruitful arts, for labouring man's relief;
And life created new, and founded laws.)

And it seems worthy of note in Solomon, that, flourishing in sovereignty, in treasure, in magnificence of works, in atten-

* Mr. Glassford has "rid."

† *Partem et consortium*.—Mr. Glassford has "part and concert."

‡ Mr. Glassford has "merited."

dance and service, in shipping, moreover, and in renown of name, and in the height of men's admiration, he yet chose not any of these for the matter of his glory, but pronounced thus : "The glory of God is to conceal a thing ; the glory of the king is to find out a thing."

Then (if he will) let any one reflect what difference is between the life of man in any the most cultivated province of Europe, and in some the wildest and most barbarous region of the new Indies ; he shall esteem the difference so wide, as it may be deservedly said, that "man is to man a god," not on account of help only and advantage, but also on a comparison of estate. And this is procured neither by soil, nor climate, nor bodily power, but by arts.

Again, it is to our purpose * to remark the force, and virtue, and consequences, of things invented ; which in none others more manifestly appear than in those three unknown to the ancients, and whose beginnings, though recent, are dark and without celebrity ; namely, the *art of printing*, *gunpowder*, and the *mariner's needle*. For these three have altered the face and condition of the whole world ; the first in letters, the second in war, the third in navigation ; whence innumerable changes of things have ensued ; so that not any government, not any sect, not any planet, seems to have exercised a greater command and influence,† as it were, upon human affairs, than these mechanical inventions ‡ have exercised.

Moreover, it will not be foreign to distinguish three kinds and degrees, as it were, of human ambition. The first is of those who desire to enlarge their own power in their own country ; which sort is common and unworthy. The second, of those who struggle to extend the power and dominion of their country among human kind ; and that has more of dignity doubtless, not less of cupidity. But if one endeavours to renew and enlarge the power of the human kind itself, and its empire over the universe, beyond question this ambition (if it is to be so called, indeed) is both more wholesome than the others, and more majestic. But man's sovereignty over things is placed in art and science alone. For nature is not commanded except by obeying.

Besides, if the usefulness of any one invention separately

* Mr. Glassford has "availing."

† Mr. Glassford has "influx."

‡ Mr. Glassford has "mechanicals."

have moved * men so, as that they have accounted † him who, by some particular benefit, could bind the whole human race, to be more than man; how much higher shall it not be thought to invent something so excellent, that by it all things else may readily be invented? And yet (that we may every way speak the truth), in the same manner that we are much beholden to the light, for that by it we are able to journey, to exercise arts, to read, to discern each other; and, nevertheless, the view itself of the light is a more excellent and a more beautiful thing than its manifold uses; so, for certain, the very contemplation of things as they are, without superstition or imposture, error or confusion, is of greater worth in itself than the whole fruit of inventions.

Lastly, if any should object the depravation of knowledge and arts to uses of malice, and luxury, and the like, let it move no one. For it may be said of all earthly goods; of wit, courage, strength, beauty, riches, light itself, and every thing else. Let mankind only recover their right over nature, which belongs to them by the divine endowment, and room be given for its exercise; just reason and sound religion will direct the use.

In the 130th and last aphorism of this First Book Bacon intimates that he does not attribute to the art of interpreting nature, which he is now about to expound, any absolute necessity (as if nothing could be done without it), nor does he even hold it forth as perfect, or such as that nothing can be added to it. On the contrary, it becometh *him*, more especially, by whom the mind is always considered not simply in its own powers, but as it is connected with things, to hold that the art of discovery may grow with the progress of discovery.‡

* Mr. Glassford has "should move."

† Mr. Glassford has "as they should account."

‡ The point of this concluding sentence is lost in Mr. Wood's translation:—"On the contrary, considering the mind in its connexion with things, and not merely relatively to its own powers, we ought to be persuaded that the art of invention can be made to grow with the inventions themselves."

THE Second Book of the *Novum Organum*, though much longer than the First, contains much less that is interesting at the present day, and a very summary review of it will suffice. Occupied more with facts and special investigations than with general views and principles, it not only wants the unity and finish which distinguish the First Book, but, owing to the immature state of physical knowledge in Bacon's day, and his own extremely imperfect acquaintance with any of those branches of it that had been at all systematically cultivated, it is full of matter entirely worthless in itself, and only curious as now and then illustrating the past history of science. We will extract, however, all that is necessary for putting the reader in possession of what is called the Baconian System of Philosophy, in so far as it is here expounded.

The Book, which is arranged, like the First, in a series of Aphorisms (though they do not so well deserve that title as the generally brief, compact, and pointed paragraphs, or statements, of the former Book), begins with a disquisition on the investigation of what Bacon calls *forms*, which, with the examples, extends over the first twenty aphorisms, making about a third part of the Book. The commencing aphorism may be thus literally translated :—

To generate and superinduce a new nature, or new natures, upon a given body is the labour and the aim of human power. But to discover the form of a given nature or its true difference [that is, from other natures], or its naturalizing nature (*naturam naturantem*), or its fountain of emanation (for such are the terms we possess approaching nearest to the indication of the thing), is the labour and the aim of human science. And to these primary labours are subordinated two other labours which are secondary and of inferior mark ; to the former, namely, the transformation of concrete bodies into one another, in so far as that is within the limits of possibility ; to the latter, the discovery, in every kind of generation and motion, of the latent process as extending from the manifest agent and the manifest material to the acquired form ; and the discovery in like

manner of the latent conformation (*schematismi*) of bodies which are quiescent and not in motion.

The reasoning then proceeds as follows. Although nothing really exists in nature except individual bodies, producing pure individual acts according to the law that governs them; yet in science, that law, and the investigation, discovery, and explanation of it, constitute the foundation both of knowledge and of practice. That law* is what is to be understood by the form of anything in nature. It is only the knowledge of forms that comprehends the unity of nature in the most dissimilar substances, and that therefore can enable us to discover and show forth things that have never yet been done, and such as neither the vicissitudes of nature, nor the labours of experiment, nor accident itself, would ever have brought about, or such as would never have entered men's thoughts. The safest way is to begin and build up the sciences from those foundations which are laid with a reference to practice, and to allow that to mark out and determine the part of contemplation, or theory. It is then laid down in regard to a true and perfect rule for every kind of operation, that it be certain, free, and tending to actual performance ("disponens sive in ordine ad actionem"). "And this," continues Bacon, "is the same thing with the discovery of a true form. For the form of any nature is such that, it being set up (*posita*), the given nature infallibly follows. Wherefore it is constantly present when the nature is present, and universally declares it, and is in the whole of it. This same form is such, that, it being removed, the given nature infallibly vanishes. Wherefore it is constantly absent when the nature is absent; and constantly negatives it, and is in it alone. Lastly, the true form is such, that it

* That law and its paragraphs (*ejusque paragraphos*), says Bacon. "The paragraphs of a law are merely its clauses. Mr. Wood's translation—"This law, and its parallel in each science"—(whatever the latter expression may mean) is quite inadmissible.

deduces the given nature from some fountain of an essence which exists in many things, and which is better known to nature (as they express it) than the form itself. Wherefore, respecting a true and perfect axiom of science, this is what we pronounce and lay down; that there be found some nature which shall be convertible with the given nature, and which shall yet be a limitation of a more known nature after the manner of a true genus. But these two rules, the active and the contemplative, are the same thing; and that which is the most useful in practice, the same is the most true in theory."

It may be presumed that it is not from passages such as this that Bacon derives his claim to be accounted the father of modern physical science. But the notions which he here enunciates constitute an important part of his philosophical system. The investigation of what he calls *forms*, indeed, may be said to be the grand object or purpose of his philosophy. He conceives that little real improvement in science is to be hoped for in any department of nature without the discovery of forms. Yet it may be questioned if he attached any clear or consistent idea to the term. He informs us, indeed, in one of the above aphorisms, and more expressly in a subsequent one (the 17th), that a form is the same thing with a law; and hence it has been commonly stated that whenever Bacon speaks of a form in physics we are to understand him as meaning simply what is now commonly called a law of nature. But the fact is, that a law of nature with him is quite a different thing from what is now so called. This is evident from his explanations of what he means by a law or form, and still more from his examples. We have found him, for instance, in the Fourth Book of the *De Augmentis** asserting that no inquisition had been made into the form of light, in the same paragraph in which he complains that the attention of inquirers had been solely directed to what he calls perspective and radiations, and that the treat-

* See *ante*, p. 9.

ment of the whole subject had been vitiated by the application of mathematics. The fact that the angle of reflection is equal to the angle of incidence would not have been accepted by Bacon as a law of light. A law of nature in modern physics is merely a statement of the manner in which nature has been uniformly found to act in certain given circumstances. Hence it implies always movement or process. It is a statement of some *operation* of nature. Modern physics know nothing of any law of light, or heat, or any thing else, in a state of rest or inaction. Bacon's use of the term has no such limitation. With him every natural substance—every nature as he terms it—has its law, absolutely and under all circumstances; which he tells us, as we have seen, is the same thing with that which distinguishes it from every other nature, or with its *natura naturans*, or the nature that produces it and makes it what it is, or with what he calls the fountain from which it emanates, meaning evidently some principle in the constitution of things to which the substance owes its existence. Anything more entirely distinct, more widely different, from what is now understood by a law of nature cannot be imagined.

One of the ablest and most judicious commentators upon the *Novum Organum*, indeed, and one who has carried highest the claims of the method therein unfolded, in respect both of its novelty and its practical importance, the late Professor Playfair of Edinburgh, has in his 'Dissertation on the Progress of Mathematical and Physical Science,' prefixed to the *Encyclopædia Britannica*, frankly given up all the pretensions of the Baconian *form* to be regarded as anything of the same kind with what we now call a law. Having explained that the *form* of a phenomenon, in the language of Bacon, is its cause, or its essence, he adds: "The form, then, differs in nothing from the cause; only we apply the word *cause* where it is event or change that is the effect. When the effect or result is a permanent quality, we speak of the form or essence."* And afterwards he ob-

* Dissertation, p. 459.

serves : " It also appears that Bacon placed the ultimate object of philosophy too high, and too much out of the reach of man, even when his exertions are most skilfully conducted. He seems to have thought, that, by giving a proper direction to our researches, and carrying them on according to the inductive method, we should arrive at the knowledge of the essences of the powers and qualities residing in bodies ; that we should, for instance, become acquainted with the essence of heat, of cold, of colour, of transparency. The fact, however, is, that, in as far as science has yet advanced, no one essence has been discovered, either as to matter in general, or as to any of its more extensive modifications."* And again ; " In consequence of supposing a greater perfection in knowledge than is ever likely to be obtained, Bacon appears, in some respects, to have misapprehended the way in which it is ultimately to become applicable to art. He conceives that, if the *form* of any quality were known, we should be able, by inducing that form on any body, to communicate to it the said quality. It is not probable, however, that this would often lead to a more easy and simple process than that which art has already invented. In the case of colour, for example, though ignorant of its form, or of the construction of surface which enables bodies to reflect only light of a particular species, yet we know how to communicate that power from one body to another. Nor is it likely, though this structure were known with ever so great precision, that we should be able to impart it to bodies by any means so simple and easy as by the common process of immersing them in a liquid of a given colour."† This is gently expressed, but sufficiently explicit. We may remark, however, that the discovery of a construction of surface which enables bodies to reflect only light of a particular species certainly would not have satisfied Bacon's demand for the *form* either of light or of colour.

He proceeds to say that the rule or axiom respecting the transformation of bodies is of two kinds ; the first

* Dissertation, p. 473.

† Ibid.

contemplating the body as an aggregate of simple natures; the second, which depends on the discovery of the latent process, proceeding not by simple natures, but by concrete bodies, as they are ordinarily found in nature. A long illustration of this useless distinction is wound up by a warning that no one must hope to settle the question whether the diurnal motion be the rotation of the earth or of the heaven unless he shall have first made himself master of the nature of spontaneous rotation.

The subject of the Latent Process is then taken up. By this is meant not any measures, marks, or steps of a process, which are discernible in bodies; but such a continuous process as for the most part escape the senses. The investigation of this is put forward as altogether a new proposition. Equally new is asserted to be the investigation and discovery of the latent schematism, or internal conformation, of bodies. For this latter object, we are told, "a separation and solution of bodies is to be effected, not by fire, but by reasoning and true induction, with the aid of experiments; and by a comparison with other bodies, and a reduction to simple natures, and their forms, of those things which meet and are interwoven in composition; and we must pass from Vulcan to Minerva, if we would bring forward into the light the true textures and conformations of bodies, upon which all occult and, as they are called, specific properties and virtues in things depend, and whence also every rule of effective alteration and transformation is derived." "And in all discovery of latent conformation," it is afterwards added, "it is from the primary axioms that there is sent in the true and clear light which dissipates all darkness and deceit." There is no reason to apprehend that in this way we shall be led to the atomic theory of the Epicureans,—"which," says Bacon, "presupposes a vacuum and immutable matter, both of which notions are false,"—but only to true particles, such as they are found to be. And it is further stated that the inquisition of nature proceeds best when the physical is terminated in the

mathematical; that is apparently, when a physical discovery is converted into a mathematical theorem.* Finally, from the two kinds of axioms arises the true division of philosophy and the sciences; according to which, by a transference of the received terms to his own sense, Bacon proposes that the investigation of *forms*, which are by their very nature eternal and immovable, should constitute Metaphysics; and that the investigation of the agent (*efficientis*), and of the material, and of the latent process, and of the latent schematism (which all regard the common and ordinary course, not the fundamental and eternal laws, of nature), should constitute Physics. And to these sciences he proposes that two practical arts should be respectively considered as subordinate; namely, to Physics Mechanics, and to Metaphysics Magic, (in a purified sense of the term), "on account of its broad ways, and its ample empire over nature."†

Having thus settled the scope or object of his philosophy, Bacon next, in the 10th aphorism, proceeds to lay down its precepts or rules, and to illustrate them by examples. The Interpretation of Nature he divides into two parts;—the first, the erecting and building up of axioms from experiment; the second, the deducing or deriving of new experiments from axioms. And the first is further subdivided into what he designates three ministrations, or services; namely, that for the senses, that for the memory, and that for the mind or reason. By means of the first is to be prepared, as the foundation of the whole business, a sufficient collection of facts, or a Natural and Experimental History; by the second, these facts are to be properly distributed and arranged into

* The Latin is "quando physicum terminatur in mathematico;" which will hardly warrant Mr. Wood's translation, "when mathematics are applied to physics,"—whatever difficulty there may be in assigning Bacon's true meaning.

† These last words seem to be understood, erroneously, by Mr. Wood, as connected with, and explanatory of, the preceding expression, "in a purified" (or, as he translates it, in the purest) sense of the term."

Tables ; by the third, that true and legitimate Induction is to be applied, which is the very key of the interpretation.

An example of the investigation of forms is then given in an investigation respecting the form of Heat. This extends over the eleven aphorisms from the 11th to the 20th inclusive. First, twenty-seven instances are enumerated, without order, of things possessing the nature or quality of heat ; forming what is demonstrated a Table of Essence and Presence. Next is given a collection of thirty-two instances in which the quality of heat is wanting, while they are all at the same time such as to have the character of negatives or exceptions to one or other of the preceding instances, so that they are called by our author Proximate Instances (*Instantiæ in Proximo*) : they form his table of Declination or Absence in Proximity. Thirdly, there are set down forty-one instances in which the quality of heat exists in different degrees according to circumstances ; making what is called the Table of Degrees, or of Comparison. "For," says Bacon, "since the form of any thing is the very thing itself, and a thing differs from its form no otherwise than as the apparent differs from the existent, or the outer from the inner, or in relation to man from in relation to the universe ; it necessarily follows that no nature can be received for a true form unless it constantly decreases when the nature itself decreases, and in like manner be constantly augmented when the nature itself is augmented." Here the term *nature* (*natura*) is evidently used in two senses ; though what they precisely are it might be hazardous to attempt to define.

These three tables having been drawn up,—an operation which Bacon terms the Presentation or Exhibition (*Comparentia*) of instances to the understanding,—two of the three ministrations have been performed. Now, therefore, commences the third work, that of Induction. "For there is to be found," says Bacon, "upon the presentation of all and each of the instances, such a nature as with the given nature may constantly be present and

absent, increase and decrease, and be (as has been said above) the limitation of a more common nature.* If the mind attempt this in the first instance by an easy act of affirmation,† (which, when left to itself, it always does,) there arise fancies, and notions, all ill defined, and axioms continually requiring correction, unless, indeed, (as is the custom of the schools,) we would contend for falsehoods. These conjectures will no doubt be better or worse, in proportion to the faculty and force of the understanding by which the operation is performed. God, no doubt, (the bestower and creator of forms,) and perhaps the angels and superior intelligences, are competent to recognize forms affirmatively at once, and at the beginning of the contemplation. But assuredly this is beyond the power of man; to whom it is only given to proceed in the first instance by negatives, and to end at last with affirmatives, after every kind of exclusion."

Rejection or exclusion, therefore, he proceeds to intimate, is the first work of true induction, in the investigation of forms; the rejection, that is to say, "of each of those natures which are not found in any instance where the given nature is present; or are found in any instance where the given nature is absent; or are found in any instance to increase when the given nature decreases; or to decrease when the given nature increases." After such rejection and exclusion properly made, will remain in the second place, as it were at the bottom, an affirmative, solid, true, and well-defined form, mere volatile opinions going off into smoke.

* In the Latin "*limitatio naturae magis communis.*" Mr. Wood translates "a more common limit of the nature." But the construction of *communis* is indicated, we apprehend, by the preceding passage to the same effect in the 4th aphorism, to which reference is made:—"et tamen sit limitatio naturae notioris."

† This would seem to be the sense intended to be conveyed by "*Hoc si mens jam ab initio facile tentet affirmative.*" Mr. Wood's translation omits the "*facile*," as it also does altogether the concluding clause of this sentence.

We give the seventeenth aphorism in Shaw's translation:—

But here a general caution, or perpetual admonition, must be given, lest, as we seem to attribute so much to forms, what we say of them should be understood of such forms as men have hitherto accustomed themselves to consider.

For we do not at present speak of compound forms, that is, combinations of simple natures, according to the common course of the universe, as the form of an eagle, a lion, a rose, gold, &c., the time of treating which will be when we come to concealed processes and secret textures, and the discovery of them, as they are found in those called substances, or concrete natures.

And even in the case of simple natures, we must not be understood to mean any abstract forms, or ideas, that are either undetermined, or ill-determined, in matter. For when we speak of forms, we mean no other than those laws and determinations of pure action which regulate and constitute any simple nature, as heat, light, and gravity, in all kinds of matter and subjects susceptible thereof; and therefore the form of heat, or the form of light, is the same thing as the law of heat, or the law of light: for we perpetually keep close to practice and things themselves; and therefore when we say, for example, in the inquiry into the form of heat, reject tenuity, or tenuity is not of the form of heat, it is the same as if we said, men may superinduce heat upon a dense body; or, on the other hand, that men may take away heat from a rare one.

And if any one shall think that our forms have somewhat abstracted in them, because they appear to mix and join together things that are heterogeneous, as the heat of the celestial bodies, and the heat of fire; the fixed redness of a rose, and the apparent redness of the rainbow, the opal, or the diamond; death by drowning, and death by burning, stabbing, the apoplexy, consumption, &c., which, though very dissimilar, we make to agree in the nature of heat, redness, death, &c., he must remember that his own understanding is held and detained by custom, things in the gross, and opinions. For it is certain that the things above mentioned, however heterogeneous and foreign they may seem, agree in the form, or law, that ordains heat, redness, and death. Nor can the human power be otherwise freed, and set at liberty from the common course of nature, and extended and exalted to new efficient, and new ways of working, than by disclosing and investigating this kind

of forms. But after treating of this unity of nature, which is a most capital thing, we shall proceed to the true divisions and paths of nature, as well the ordinary as internal.

The process of rejection or exclusion is then illustrated by a collection of the natures which appear from the preceding tables not to be the form of heat; as, for instance, from heat being found in many bodies not luminous, we reject light as that form. The natures enumerated in the table are fourteen; but it is added that there are some more, and it is intimated that the tables are not presented as perfect, but only as examples. Each particular instance in the table, as is observed, invalidates the claim of some nature or other to be accounted the form; and "in operating upon heat," we are told, "man is freed from all the natures therein enumerated." The meaning seems to be, that no one of the said natures will need to be made use of when we come to apply the form of heat (by which Bacon imagined such great things were to be done)—if we should ever be fortunate enough to catch it.

It is acknowledged that the Table of Exclusions never can be made perfect in the first instance; and indeed this is sufficiently manifest; yet, as truth emerges sooner even from error than from entire confusion, it is deemed proper that at this stage, after the three tables of First Presentation, such as they are, have been drawn up and considered, the understanding may make an attempt in the work of interpreting nature affirmatively. This attempt is designated the Permission of the Understanding, or the Inchoate Interpretation, or the First Vintage. And then follows an example in the First Vintage respecting the Form of Heat. It is preceded or introduced by a paragraph to the effect that the form of any thing exists in all and each of the instances in which the thing itself exists; for that otherwise it were not the form; so that clearly no contradictory instance can be here produced. In other words, all the instances from which this First Vintage is gathered must exhibit the form more or less evidently. But the form is much

more conspicuous in some instances than in others; in those, namely, where the nature of the form is less restrained, and impeded, and rendered subordinate ("reducta in ordinem") by other natures. Such instances it is proposed to call Coruscations or Out-blazings (*Elucescentiæ*), or Displaying Instances (*Instantiæ Ostensivæ*).

From each of the instances and all of them taken together Bacon conceives that the nature the limitation of which is Heat appears to be Motion. Afterwards he notes four differences which limit motion and constitute it into the form of heat; and the final conclusion to which he comes in this First Vintage is, that the form or true definition of heat (regarded with reference to the universe, and not simply with relation to sense) may be thus expressed:—"Heat is motion, expansive, restrained, and pressing through the smaller parts of bodies: the expansion being characterized by its spreading in all directions, but yet inclining somewhat towards the upper; and the pressure through the parts, by its being not at all sluggish, but vigorous and somewhat impetuous." We give the remainder of the statement as translated by Shaw:—

And as to practice, the case is exactly correspondent, and amounts to this; that, if in any natural body a motion can be excited, which shall dilate or expand, and again recoil or turn back upon itself, so as that the dilation shall not proceed equably, but partly prevail and partly be checked, any man may doubtless produce heat; without at all regarding whether the body that is wrought upon be elementary, as they call it, or earthly; or whether it be enriched with a celestial influence; whether it be luminous or opaque; rare or dense; locally expanded or contained within its original dimensions; whether it tend to dissolution or remain in its native state; whether it be animal, vegetable, or mineral; whether it be water, oil, air, or any other substance that is susceptible of the foresaid motion. And heat, in respect of the sense, is the same thing; only with such relations as belong to sense.

This seems very like a conclusion in which nothing is

concluded. Professor Playfair, however, has pronounced that, although Bacon's collection of facts on the subject of Heat be imperfect, "his method of treating them is extremely judicious, and the whole disquisition highly interesting."* But he does not go so far as Dr. Shaw, who expresses his admiration of this example of the method of investigating forms, as follows:—"Though this method is here so fully delivered, and promises better things than possibly any other method of inquiry hitherto known, yet it appears strangely to be disregarded. And certainly it should seem as if very few were apprized that this method, thoroughly pursued, is an actual demonstration, as justly and properly suited to physics, or indeed to all philosophy, as mathematical demonstration and algebra are to geometry and general mathematics."

The investigation of the form of Heat appears to have been formerly regarded as the most interesting portion of the *Novum Organum*, or at least as the part of the work that was likely to prove the most generally attractive. It is extracted in full, without any reference to the *Organum*, and produced as a separate treatise, in a small collection of Bacon's physical writings printed in a 12mo. volume at Leyden in 1638, with the title of "*Francisci de Verulamio Historia Naturalis et Experimentalis de Ventis, &c.*;" pp. 191-277. It is also included, under the title of "*The Natural and Experimental History of the Form of Hot Things*," in an English translation of this volume by R. G., Gent., originally published in 12mo. at London, in 1653, and reprinted in the Second Part of the *Resuscitatio*, folio, Lon., 1651.

And the investigation may be admitted to be really, in some respects, both curious and ingenious. It is curious as a record of the knowledge, or rather of the ignorance, of that age, and of Bacon himself. Even Playfair does not effect to rate it high on account of many new facts or observations which it contains. Bacon, we are merely told, "here proposes, as an experiment, to try the reflection of the heat of opaque bodies. He mentions also the

* Dissertation, p. 460.

vitrum calendare, or thermometer, which was just then coming into use. His reflections, after finishing his enumeration of facts, show how sensible he was of the imperfect state of his own knowledge." The arrangement of the instances, indeed, trivial and wholly insignificant as a great many of them are, is not a little elaborate and imposing. But, even without reference to the visionary character of the object sought, it is plain that no process of physical discovery ever can have been, or ever will be, successfully conducted in the fashion here exemplified.

Mr. Coleridge, in *The Friend* (Vol. III., Essay IX.), and also in the *Introduction to the Encyclopædia Metropolitana* (p. 27), has contended that Bacon demands in all philosophic experiment, as its motive and guide, what may be called "the intellectual or mental initiative;" that is, "some well-grounded purpose, some distinct impression of the probable results, some self-consistent anticipation, as the ground of the *prudens quaestio*, the forethoughtful query, which he affirms to be the prior half of the knowledge sought, *dimidium scientiæ*." And there are undoubtedly some expressions in his writings which show that this view had not altogether escaped him. One passage which Coleridge quotes is in the *Distributio*, or Plan, of the *Instauratio Magna*, and will be found translated in our abstract at the beginning of the present volume. He there says, in asserting what he calls the far greater subtilty of experiments than of the senses, "We speak of such experiments as are skilfully and artistically imagined and applied *in accordance with the design of the inquiry*" (*ad intentionem ejus quod quaeritur*). He then proceeds:—"Itaque perceptioni sensus immediatæ ac propriæ non multum tribuimus; sed eo rem deducimus, ut sensus tantum de experimento, experimentum de re judicet." "This last sentence," observes Coleridge, "is, as the attentive reader will have himself detected, one of those faulty verbal antitheses not unfrequent in Lord Bacon's writings. Pungent antitheses, and the analogies of wit, in which the resemblance is too often more indebted to the double or

equivocal sense of a word than to any real conformity in the thing or image, form the *dulcia vitia* of his style, the Dalilahs of our philosophical Samson. But in this instance, as indeed throughout all his works, the meaning is clear and evident; namely, that the sense can apprehend, through the organs of sense, only the *phænomena* evoked by the experiment: *vis vero mentis ea, quæ experimentum excogitaverat, de re judicet*.* that is, that power which out of its own conceptions had shaped the experiment must alone determine the true import of the *phænomena*." About the correctness of the view here taken by Coleridge of the nature and necessary method of philosophical investigation, there can be no question. To transcribe a few words that we have used elsewhere upon this subject:—"Whenever a discovery is made without being anticipated, we say that it has been made by chance. The history of all discoveries that have been arrived at by what can with any propriety be called philosophical investigation and induction attests the necessity of the experimenter proceeding in the institution and management of his experiments upon a previous idea of the truth to be evolved. This previous idea is what is properly called an *hypothesis*, which means something placed under as a foundation or platform on which to institute and carry on the process of investigation. A *theory* is a completed view of an harmonious system of truths, evolved and proved by calculation or induction. As the latter is the necessary completion of every philosophical inquiry, so the former is its equally indispensable beginning."† But, if this was Bacon's view, certainly not a trace of it is to be found in the present investigation into the form or nature of Heat; or, it may be added, of any of his other experimental inquiries. His method of procedure, as here developed, sets out simply with a blind accumulation of instances, no more collected under the guidance of any

* But whence are these words? Are they Bacon's or Coleridge's own?

† Pursuit of Knowledge under Difficulties, II., 255 (in Weekly Volume, No. 31.)

kind of anticipation or hypothesis than are the fishes, great and small, that the net brings up when cast into the sea. Whatever chances to come to hand is laid hold of. It is no doubt probable that in this way all the necessary instances will usually be obtained; we do not assert that the method would prove positively ineffectual in any case in which it should be employed; what we say is, that is not the shortest method, nor the method which ever has been or ever will be employed in the actual business of investigation and discovery. It has been employed indeed by Bacon himself, who never invented or discovered any thing in physics: but by no other human being. If Bacon had laid it down as one of the rules or principles of his method, that, in the course of conducting any investigation according to it, a man should walk a certain number of measured miles on all fours, or with peas in his shoes; or if he had required that every one of his instances should be set down in all the languages of Europe; the method might still have served its purpose, notwithstanding the useless trouble thus imposed by it. But the indiscriminating and unreflecting rapacity with which he gathers in his instances from all quarters, and of all kinds, only encumbers and bewilders the investigation. The sagacity, or species of prescience, which is a part of the inventive faculty, dispenses with all this labour and all this parade. Instead of all kinds of instances, a few judiciously selected instances, sometimes only a single instance, will be all it requires. From those few, or that one, it will work its way to its end much more expeditiously and more surely than if it had started with the advantage of having previously made a formal survey of all the instances in nature. The notion of any one seriously setting about a philosophical investigation by means of Bacon's three tables of Essence and Presence, of Declination, and of Degrees, is ludicrous. It reminds one of the "project for improving speculative knowledge by practical mechanical operations" of the professor in the Grand Academy of Lagado, the frame with the forty iron handles, by which "the most ignorant person, at a reasonable charge, and with a little bodily

labour, might write books in philosophy, poetry, politics, laws, mathematics, and theology, without the least assistance from genius or study." It might almost indeed be suspected that Swift here had Bacon in his eye. Other things in the irreverent satire seem to glance at the very words of the illustrious author of the *Instauratio Magna*; as when the professor is made to declare that his invention "had employed all his thoughts from his youth," and to say "he flattered himself that a more noble, exalted thought never sprang in any other man's head." At any rate, the description of the invention is hardly an exaggeration of what appears to have been Bacon's own notion of the efficacy of his *Novum Organum*, or new instrument of discovery. It was to be almost literally a machine in men's hands. It was to level intellects, and enable the weakest to do the work of the strongest. So far from its requiring any guiding idea or anticipation in the mind of the experimenter, it was to make all inventive sagacity unnecessary and useless.

We now enter upon what may be called the second part of this Second Book, in which the author proposes to consider the remaining helps necessary for the understanding in the work of the Interpretation of Nature, and of a true and perfect Induction. He will treat, he says, respecting, first; the Prerogatives among Instances (*Prærogative Instantiarum*); secondly, the Aids or Props (*Admnicula*) of Induction; thirdly, the Rectification of Induction; fourthly, the Varying of the Investigation according to the nature of the subject; fifthly, the Prærogative ones among Natures, in so far as regards investigation, or what should be investigated first, what last: sixthly, the Limits of Investigation, or a synopsis of all the natures in the universe; seventhly, the Reduction to Practice, or what relates to man; eighthly, the Preparations (*Parasceus*) for investigation; lastly, the Ascending and Descending Ladder or Stair (*Scala*) of Axioms. Of this extensive design, however, all that we have actually executed is the first head.

Anciently, when the Roman people voted by centuries, the century to whose lot it fell to give its vote

(*rogari*) first was called *Praerogative*, literally, the first consulted century. By the *Praerogative Instantiarum*, therefore, Bacon means merely those instances that deserve first or principally to be attended to. It will be more convenient in English to vary the form of the expression, and to call them, as has been usually done, *Prerogative Instances*.

The remainder of this Second Book of the *Novum Organum* consists of an enumeration of twenty-seven different kinds of Prerogative Instances, accompanied with elaborate expositions and illustrative exemplifications. The account will not admit of any intelligible abridgment. We will preserve the list of names complete; but all that we shall attempt further will be to extract some of the more interesting and important passages; which we shall give as translated by Shaw.

1. *Solitary Instances*.—

Among the prerogative instances for interpreting nature, in first place come the solitary kind; that is, those which exhibit the nature inquired after, in such subjects as have nothing common with others besides that very nature; or, those that exhibit the nature inquired after, in such subjects as are every way similar to others, excepting in that very nature. For it is manifest, that such instances as these will shorten the inquiry, and promote and hasten the exclusion; so that a few of them may do the service of many.

For example, if the inquiry be about the nature of colour, solitary instances are prisms, and crystal gems, or glasses, which represent colours, not only in themselves, but also externally upon a wall, &c. Understand the same of dews, &c. For these have nothing in common with the fixed colours of flowers, coloured gems, coloured glass, metals, various woods, &c. besides the colour itself. Whence it may be easily inferred, that colour is nothing more than an alteration in the rays of light, occasioned, in the first case, by different degrees of incidence; and, in the second, by the different texture or structure of the body, and so reflected to the eye. But these instances are solitary, or single, in point of likeness.

Again, in the same inquiry, the distinct veins of black and white in marble, and the variegation of colours in flowers of the same species, are solitary instances, for the black and white

parts of marble, or the spots of white and purple in carnations, agree almost in every respect, except in colour. Whence it is easily collected, that colour does not greatly depend upon the intrinsic nature of the coloured body, but is owing to a somewhat gross, or bare mechanical texture of the parts. Thus these instances are solitary, in point of difference. And we call both the kinds by one and the same name.

2. *Travelling Instances (Instantiae Migrantes).*—

In the second place come travelling instances, or those wherein the nature inquired after travels, or advances to generation, when it was not before in being; or, on the contrary, travels, or tends to destruction, when it was in being before. And, therefore, in either correlative, such instances are always duplicate; or rather one instance, in motion, or passage, is continued to the opposite period. And instances of this kind not only accelerate and confirm the business of exclusion, but also drive the affirmation, or form itself, into a narrow compass. For the form of the thing must necessarily be somewhat introduced, or abolished, by this transmigration. And, though all exclusion promotes and forwards the affirmation, yet this is more directly done in the same subject than in different ones; for it plainly appears, from all we have said before, that the form discovering itself in one thing leads to its discovery in all the rest. But the more simple this passage is, the nobler the instance should be esteemed.

Again, these travelling instances are of great use in practice, because, as they exhibit the form joined with an efficient, or privation, they clearly design or mark out the practical operation in some cases; whence any easy passage is also afforded to the neighbouring discoveries. There is, however, some danger in these instances, that requires a particular caution; for they may be apt to restrain the form too much to the efficient, and to infect or at least to tinge the understanding with a false notion of the form, through an apparent mixture of the efficient; whereas the efficient is never more than the vehicle of the form. But this inconvenience is easily remedied by making a just exclusion.

To give an example of a travelling instance: suppose the nature inquired after were whiteness, an instance advancing to generation is glass, whole, and in powder; and again, simple water, and water beat into froth; for whole glass, and simple water, are transparent bodies, not white; but powdered

glass, and the froth of water, are white, not transparent. It comes therefore to be inquired, what has happened to the glass, or water, in this transmigration; for, it is manifest, that the form of whiteness travels, or is conveyed over by pounding the glass, and agitating the water; but nothing is here found added, besides a bare comminution of the parts of the glass and the water, together with the interposition of the air. And it is no small acquisition in discovering the form of whiteness, that two bodies, of themselves more or less transparent, viz. air and water, or air and glass, being mixed together, in subtile or small parts, should exhibit whiteness, by differently reflecting the rays of light.

We must also give an example of the danger, and caution, above mentioned; for it may here readily occur to the understanding, depraved by these kinds of efficient, that air is always necessary to the form of whiteness, or that whiteness is generated only by transparent bodies, which two positions are absolutely false, and rejected by numerous exclusions. It will rather appear, without the interposition of the air, &c. that the bodies perfectly uniform, or similar, in their optical parts, prove transparent: that those which have the simple texture, or arrangement of their parts disturbed, are white; that a dissimilarity in the regular texture of bodies affords all colours, except black; and that a dissimilarity in a compound, absolutely irregular, and confused texture, constitutes blackness. And, for an instance advancing to destruction in the same nature of whiteness, we have it in froth subsided, or snow dissolved; for water deposits its whiteness, and puts on transparency, upon becoming entire, without any intermixture of air.

We must by no means omit, that under travelling instances should be comprehended, not only those which travel to absolute generation and privation, but such likewise as travel to a greater or less degree of the nature sought, since these also tend to the discovery of the form, as plainly appears both from the definition of a form, above laid down, and the table of comparison. And therefore the instance of paper, which is white when dry, but proves less white when wet, and comes nearer to the state of transparency, upon the exclusion of the air, and the reception of the water, is of the same use as the instances above mentioned.

3. *Forthshowing Instances (Instantiae Ostensivae);*

called also *Blazings* (*Ehuescentiæ*) and *Liberated* and *Predominant Instances*. It is as an example of these instances that the Thermometer is introduced, under the name of *vitrum calendare æris*, which should mean the callendar glass of the air, but which Bacon probably intended to signify the glass for measuring the *heat* of the air, under the notion that *calendare* was a derivative of *caleo*.*

4. *Clandestine or Twilight Instances*, which are the opposite of the preceding.—

For example; let the nature inquired into be consistence or solidity, the contrary of which is liquidity or fluidity, then clandestine instances are such as exhibit some faint and low degree of consistency in a fluid; suppose a bubble of water, which is a kind of consistent and determinate pellicule, made of the body of the water. In like manner icicles, if there be water to follow them, lengthen themselves out in a very slender thread, to prevent a discontinuity of the water; but if there be not a sufficient quantity to follow, the water then falls in round drops, which is the figure that best supports it against discontinuation; and at the very instant when the thread of water ends, and the falling in drops begins, the water recoils upwards to avoid being discontinued. So in metals, which are fluid upon fusion, though a little temerarious, some of the melted mass frequently springs up in drops, and sticks in that form to the sides of the crucible. There is a like instance in the looking-glasses, commonly made of spittle by children, in a loop of rush or whalebone, where we find a consistent pellicule of water. But this is observed to much better advantage in that other diversion of children when they take strong soapy water, and blow in it with a pipe; so as to raise the water into a tower or castle of bubbles, whilst by the interposition of the air, the soapy water becomes consistent to that degree as to be thrown a considerable distance without breaking. This also appears

*. Shaw translates it the weather-glass, which would now be understood to mean the barometer, an instrument not invented in Bacon's day; but the thermometer also was formerly called the weather-glass. Thus Dryden writes:—

As in some weather-glass my love I hold,
Which falls or rises with the heat or cold.

to advantage in froth and snow, which put on such a consistency, that they may be almost cut with a knife, though they are but bodies formed of air and water, both of them fluid. These several instances seem clearly to intimate that fluidity and consistency are no more than vulgar notions relative to the human sense, and that all bodies have a real appetite to avoid discontinuation, though in homogeneous bodies, such as fluids are, it is but weak and feeble, whilst in those compounded of heterogeneous matters, it proves more strong and powerful, because the application of what is heterogeneous binds bodies up, but the entrance of what is homogeneous relaxes and dissolves them.

As a farther example; if the nature sought were attraction, or the appetite of approach in bodies, a most remarkable glaring instance, as to the discovery of the form, is the loadstone. The contrary of an attractive nature is an unattractive nature, though in a similar substance; as in iron, which does not attract iron; nor does lead attract lead, nor wood attract wood, nor water attract water. But the loadstone armed with iron, or rather the iron of an armed loadstone, is a clandestine instance; for here it happens, that an armed loadstone does not, at a certain distance, attract iron stronger than an unarmed loadstone; but if the iron be moved so near as to touch the iron of the armed loadstone, then the armed loadstone will support a much greater weight of iron, than the naked and unarmed loadstone, by reason of the similitude of substance betwixt iron and iron, which operation was altogether clandestine and secret, or concealed in the iron before the loadstone was applied. Whence it is manifest, that the form of attraction is a thing that is vivid and strong in the loadstone, but weak and latent in iron.

After the same manner, it is observed, that headless arrows of wood, being fired out of a gun, will penetrate farther into wood, or the sides of a ship, than the same arrows headed or pointed with iron, by reason of the similitude of substance betwixt wood and wood, though this before lay concealed in the wood.

Again; though air does not manifestly attract air, nor water manifestly attract water, in a state of entireness, yet one bubble approaching another makes it easier dissolve, than if the other bubble were away, by reason of the appetite of conjunction between water and water, and between air and air.

And this kind of clandestine instances, which, as we before observed, have a noble use, are most remarkable in the small

and subtile parts of bodies, because the greater masses of things follow the more general and universal forms.

5. *Constituent, or Handfilling (Manipulares) Instances* :—

For example, let the nature sought be memory, or the means of exciting and helping the memory; the constituent instances will here be, first, order, or distribution, and places for artificial memory. Order, or distribution, manifestly assists the memory; and places for artificial memory may either be places in a proper sense, as a door, a window, a corner, &c., or familiar and known persons; or any other things at pleasure; provided they be placed in a certain order; as animals, plants, words, letters, characters, historical personages, &c., though some of these are more, and some less fit for the purpose. But such kind of places greatly help the memory, and raise it far above its natural powers. Again; verse is easier learnt and remembered than prose.

And this collection, or packet, of the three above-mentioned instances, viz. order, artificial place, and verse, constitute one species of help for the memory: and this species of help may be justly called the prevention of endless search. For when a person endeavours to recollect, or call a thing to mind; if he has no previous notion or perception of what he is in quest of, he casts about, and tries every track, as it were without end: but if he has any previous notion, this infinity of search is presently cut short; and the memory is brought to hunt nearer home. But in the three instances above mentioned, there is a clear and certain previous notion contained. For in the first, there is required somewhat agreeable to order; in the second, an image is required, that has some agreement, or relation, to those fixed places; in the third, words that will stand in verse: so that infinity is thus cut off or prevented, and the search limited and restrained.

Other instances will give this second species; that whatever brings an intellectual thing to strike the sense (which is the method principally used in artificial memory), helps the remembrance.

Other instances will give this third species; that those things which make an impression by means of a strong affection or passion, as by causing fear, surprise, blushing, delight, &c., assist the memory.

Other instances will give this fourth species; that those

things sink the deepest, and dwell the longest in the memory, which are chiefly impressed upon a clear mind, that remains prejudiced, either before or after the impression; as the things we learn in childhood, or think of just before going to sleep; as likewise all the first times that things are taken notice of.

Other instances will give this fifth species; that a multitude of circumstances, or, as it were, handles or holds to be taken, help the memory: as the making of many breaks in writing, or printing; reading or repeating aloud, &c.

Lastly; other instances will give the sixth species of help; that those things which are expected, and raise the attention, stick better than such as pass slightly over the mind: whence, if a man should read a writing twenty times over, he would not remember it so well, as if he should read it but ten times, with trying between whiles to repeat it; and consulting the copy where his memory failed.

Hence there are, as it were, six lesser forms of helps for the memory; viz. (1) the cutting off infinity; (2) reducing intellectual to sensible things; (3) impression by a strong passion; (4) impression upon a mind free and disengaged; (5) variety of handles, or occasions; and (6) expectation conceived.

6. *Conformable or Proportionate Instances (Instantiæ Conformes sive Proportionatae)*; called also *Parallels or Physical Similitudes*.

But this precept cannot be too frequently inculcated, that the procedure and method of mankind in their inquiries and endeavours to collect a natural history, must be entirely altered from the method at present in use; for men's curiosity and diligence have been hitherto principally employed in observing the variety of things, and explaining the precise differences of animals, vegetables, and fossils, the greatest part of which variety and differences are rather the sport of nature than matters of any considerable and solid use to the sciences. Such things, indeed, serve for delight, and sometimes contribute to practice, but afford little or no true information, or thorough insight into nature; human industry, therefore, must be bent upon inquiring into, and observing the similitudes and analogies of things, as well in their wholes as in their parts; for these are what unite nature, and begin to build up the sciences.

7. *Singular Instances (Instantiæ Monodice)*; called also *Irregular* or *Heteroclite Instances*.

8. *Deviating Instances*.

9. *Frontier Instances (Instantiæ Limitantes)*; called also *Participles (Participia)*, from participating of two different natures; as the participle in grammar is said to be so called from its participating of the nature both of the noun and the verb.

10. *Instances of Power, or of the Fasces*; called also the *Head-works* or *Hand-works* of Man (*Ingenia sive Manus Hominis*).

For example, paper, though a very common thing, is a singular instance of art. For if well observed, artificial matters are either merely wove with direct and transverse threads, as silk, cloth, linen, &c. or made of concremented juices, as brick, clay, glass, enamel, porcelain, and the like, which if well united shine, but if less united, prove hard, but bear no polish. And all these latter substances, made of concremented juices, are brittle, and do not hold tenaciously together. On the contrary, paper is a tenacious substance, that may be cut, or torn; so that it resembles, and in a manner rivals the skin, or membrane of some animal; the leaves of some plant; or the like production of nature: for 't is neither brittle, as glass; nor thready, as cloth; for though it has its fibres, yet it has no distinct threads; but exactly resembles the texture of natural matters: insomuch that the like can hardly be found again among artificial things; but it remains perfectly singular. And in artificial things, those, doubtless, are to be preferred which imitate and resemble nature the nearest; or which, on the other hand, powerfully govern, invert, or change her.

Again; among instances of power, or the inventions and manual works of men, matters of dexterity, delusion, and diversion, are not to be rejected wholly: for some of these, though of small use, and only ludicrous, may yet be rich in information.

Lastly; neither are superstitious, and those commonly called magical, matters, to be quite excluded: for although things of this kind lie strangely buried, and deep involved in falsehood and fable; yet some regard should be had to discover whether no natural operation is concealed in the heap: for example, in fascination; the power of imagination; the sympathy or consent of things at a distance; the communication of im-

pressions, from spirit to spirit, as well as from body to body ; and the like.

11. *Accompanying and Hostile Instances* (*Instantiæ Comitatus atque Hostiles*); called also *Instances of Fixed Propositions*.

12. *Subjunctive Instances*; called also *Ultimate Instances*, or *Instances of the Terminus*.

13. *Instances of Alliance or of Union*.

14. *Instances of the Cross* (or *Crucial Instances*), a name taken from the crosses erected where two roads meet, to point out and declare their different directions; called also *Decisive* and *Judicial Instances*, and in some cases *Instances of the Oracle* and of *Command*.

They are of this kind, that when in the search of any nature, the understanding comes to an equilibrium, as it were, or stands suspended as to which of two or more natures the cause of the nature inquired after should be attributed or assigned, by reason of the frequent and common occurrences of several natures, then these Crucial instances show the true and inviolable association of one of these natures to the nature sought, and the uncertain and separable alliance of the other, whereby the question is decided, the former nature admitted for the cause, and the other rejected.

These instances therefore afford great light, and have a kind of over-ruling authority, so that the course of interpretation will sometimes terminate in them, or be finished by them. Sometimes, indeed, these Crucial Instances occur, or are found, among those already set down, but in general they are new, and expressly and purposely sought and applied, or after due time and endeavours, discovered, not without great diligence and sagacity. . . .

Let the nature sought be the spontaneous motion of rotation; and in particular, whether the diurnal motion, whereby the sun and stars rise and set, to the sight, be a true motion of rotation in the heavenly bodies, or only apparent in them, and real in the earth. The following may be a Crucial Instance in this inquiry. If any motion, from east to west, is found in the ocean, though it be ever so languid and feeble, if the same motion be found somewhat quicker in the air, especially between the tropics, where, because of the larger circles, it will be more perceptible, if the same motion be found brisk and

strong in the lower comets, if the same motion be found in the planets, so dispensed and proportioned, that the nearer it comes to the earth, the slower it proves, and the farther off the quicker, but quickest of all in the sphere of the fixed stars, then doubtless the diurnal motion should be received for real in the heavens, and the motion of the earth be rejected, because it would then be manifest that the motion from east to west is perfectly cosmical, and by consent of the universe, which having the greatest velocity in the greatest heights of the heavens, gradually decreases, and at length terminates, and comes to nothing, in what is immoveable, viz. the earth.

On the other hand, let the nature inquired into be that other motion of rotation, famous among astronomers, and opposite and contrary to the diurnal motion, viz. the motion from west to east, which the astronomers attribute to the planets and sphere of the fixed stars, but Copernicus and his followers assign likewise to the earth; and let it be sought whether there is any such motion in nature, or whether it be only imaginary, and supposed for the readiness and convenience of calculation and the sake of the beauty and regularity of a system, so as to make the celestial motions performed in perfect circles.

This motion is by no means proved true and real in the higher celestial bodies, neither from hence, that a planet does not, in its diurnal motion, return to the same fixed star again, nor from hence, that the poles of the zodiac differ from the poles of the world, which are the two things whereon this motion is founded. For the first phenomenon is well solved by the supposition of antecedence and dereliction, and the second by spiral lines, so that the inequality of the revolution, and the declination to the tropics, may be rather modifications of the same diurnal motion, than contrary motions, or performed about different poles. And if we may here, for once, side with the vulgar, and leave the fictions of astronomers and the schools (who in many cases, and without reason, offer violence to the senses, and rather affect obscurities), we judge this motion to be to the sense such as we have above described it, from a model we once had purposely made of iron wire to represent it.

But it may be a crucial instance in this inquiry, if it shall be found from any history worthy of credit, that there was a comet, which did not revolve in a manifest consent (though ever so irregularly) with the visible diurnal motion; but rather to the opposite part of the heavens, for then it will be free to judge that some such motion, contrary to the visible diurnal

rotation, may exist in nature. But if nothing of this kind can be found, such a motion should not be embraced, but recourse be had to other crucial instances about it.

Again; suppose the nature sought was gravity, this will be the cross-road. Heavy and ponderous bodies must either have a natural tendency to the centre of the earth, on account of their proper mechanism, or else be attracted by the corporeal mass thereof, as by a collection of bodies of the same nature, and so be carried to it by consent.

If the latter be the cause, it will follow, that the nearer all heavy bodies approach to the earth, the stronger, and with the greater force and velocity they will tend to it; but the farther they are from it, the weaker and the slower, and this to a certain distance; whence, if they were removed so far from the earth, as that the virtue thereof could not act upon them, they would remain pendulous, like the earth itself, without falling.

And with regard hereto this may be a crucial instance. Take a clock that moves by weights, and another that moves by a steel spring; let them be exactly adjusted, that neither of them may go faster than the other; place the clock that goes with weights upon the top of some very high building; keep the other below; then carefully observe if the clock above move slower than usual, on account of the diminished virtue of its weight. Let the same experiment be made in the deepest mines, to show whether such a clock will not move faster there, for the contrary reason; and if the virtue of the weights shall be found diminished above, and increased below the surface of the earth, let the attraction of the terrestrial mass be received as the cause of weight or gravity.

15. *Instances of Divorce.*

Then follow five orders of Instances distinguished by the general name of *Instances of the Lamp*, or of *Primary Information*; as being such as assist the senses. The first strengthen, enlarge, and rectify the immediate actions of the senses; the second bring down the imperceptible to the perceptible ("non-sensibile ad sensibile"); the third indicate the continuous processes or series of those things and motions which (as most frequently happens) are not observed except in their termination or entire course ("exitu aut periodis"); the fourth substi-

tute something when the senses are in a state of absolute destitution; the fifth excites the attention and notice of the senses, and at the same time limit the subtilty of things.

16. *Instances of the Door or of the Gate (Januæ sive Portæ)*, which are those that assist the immediate actions of the senses. But among the senses, the first place, in the furnishing of information, belongs to the sight. And the helps that may be sought for the sight appear to be of three kinds; namely, such as may enable it to see either things not previously seen; or to a greater distance than previously; or more exactly and distinctly.

Of the first kind* are the newly invented microscopes, which show the latent, and otherwise invisible small parts of bodies, and their secret textures and motions, remarkably increased in the magnitude of the object, by means whereof the exact figure and lineaments of the body of the minutest creatures, such as flies, fleas, mites, &c., as also colours and motions, before invisible, may be seen in a delightful and surprising manner.† And here, as is usual in new and strange discoveries, a superstitious observation has crept into the minds of men, as if this invention of microscopes did honour to the works of nature, but dishonour to the works of art, by showing the one much finer than the other; whereas the truth only is, that natural textures are much more subtile than artificial ones. For these microscopes are only of use in the case of minute ob-

* Shaw omits a parenthesis here to the following effect:—"not to speak of spectacles (*bis-oculi*), and the like contrivances, which are able only to correct and alleviate the infirmity of a vision not properly adjusted (*non bene dispositi*), and therefore cannot be said to convey any additional information."

† Shaw here omits the following sentence:—"It is said also that a straight line drawn with a pen or pencil is discerned by such microscopes to be very unequal and tortuous; because neither the motions of the hand, although assisted by a ruler, nor the impression of ink or of colour, are in reality equal; although their inequalities are so minute that without the aid of such microscopes they cannot be perceived."

jects, so that if Democritus had seen them, he would perhaps have rejoiced, and imagined a way was now discovered for rendering the atoms visible, which he pronounced to be no object of sight.

But the unsuitableness and insufficiency of these microscopes, except for very minute bodies (and then only when such minute bodies are not parts of larger), destroy the use of the invention; which, if it could be extended to large bodies, or to small particles of large bodies, in the piece, after the manner of making a piece of fine lawn appear like a net, so as that by this means the latent small particles and inequalities of gems, liquors, urine, blood, wounds, and many other things might be distinguished, great conveniences would doubtless arise from the discovery.

Of the second kind are telescopes, which were nobly attempted and discovered by Galileo; by means whereof, as by boats or little ships of intelligence, a nearer commerce may be opened and carried on with the celestial bodies. For by the help of these glasses, 1. The milky way appears to be a knot or cluster of little stars, perfectly separate and distinct, of which the ancients had but a bare suspicion. 2. And again, by their means it should seem that the planetary regions contain more stars besides the direct planets, and that the heavens may begin to be spangled with stars at a great distance below the sphere of the fixed stars, though with such only as are invisible without the help of telescopes. And again, 3. By their assistance we may behold the motion of those small stars, or satellites, about the planet Jupiter; from whence it may be conjectured that the revolutions of the stars have regard to several centres. 4. Again, by their means the luminous and opaque inequalities are more distinctly perceived and ascertained in the moon, from whence a geographical description might be made thereof. 5. And lastly, by means of these glasses, spots in the sun, and other things of that kind, appear to the sight; all which are, doubtless, noble discoveries, so far as they may be safely depended upon for real. But, indeed, I the rather incline to suspect them, because experience seems wholly to rest in these few particulars, without discovering, by the same means, numerous others, equally worthy of search and inquiry.*

* Galileo, some of whose telescopic discoveries are noticed

17. *Summoning Instances* (*Instantiæ Citantes*); called also *Evoking Instances*. Here Bacon introduces one of his favourite doctrines, that of the living principle, or spirit, as he calls it, which he conceives to be contained even in bodies commonly considered to be dead.

Things escape the senses, either, 1, through the distance of the object, as to place; 2, through the interception of interposing bodies; 3, because the object is unfit to make an impression upon the sense; 4, because the object is not sufficient, in quantity, to strike the sense; 5, because the time is not proportionate, so as to actuate the sense; 6, because the percussion of the object is not endured by the sense; 7, and lastly, because an object before detained, and possessed the sense, so as to leave no room for a new motion. . . .

But the reduction in the third and fourth ways regard numerous particulars, and ought on all sides to be collected in inquiries. Thus, for example, it appears that the air, the spirit, and things of that kind, which in their whole substance prove light and subtile, can neither be perceived nor touched; whence in the inquiry after such bodies, we must necessarily use reductions.

Suppose, therefore, the subjects of inquiry were the action and motion of the spirit included in tangible bodies; for every tangible body, with us, contains an invisible and intangible spirit, over which the body is drawn like a garment. And hence arise those three powerful springs, and that wonderful process, of the spirit in tangible bodies. For, 1, the spirit being discharged out of a tangible body, the body contracts and dries; 2, whilst detained, it makes the body tender, supple, and soft; and, 3, being neither totally discharged, nor totally held in, it informs, fashions, assimilates, ejects, organizes, &c. And all these are rendered sensible by visible effects.

For in every tangible, inanimate body, the included spirit first multiplies itself, and, as it were, feeds upon those tangible

in this and two or three other passages in Bacon's writings, should have been excepted from the enumeration, at p. 24, of his contemporaries whom he never mentions. Yet we see he had not nearly so much faith in the *novum organum* of the illustrious Florentine as in his own.

parts which are most disposed and prepared for that purpose ; and thus digests, works, and converts them into spirit, till at last they fly off together.

And this business of making and multiplying the spirit is brought down to the sense by the diminution of the weight of the body ; for in all drying, part of the quantity goes off, which is not only the spirit that pre-existed in the body, but a part of the body itself that was before tangible, and is now newly converted into spirit, for the pure spirit has no gravity.

The emission, or exit, of this spirit is rendered sensible by the rusting of metals and other corruptions and putrefactions of that kind, which stop before they come to the rudiments of life ; for in the more compact bodies the spirit finds no pores and passages through which to escape, and is therefore obliged to protrude the tangible parts, and drive them before it, so as to make them issue at the same time ; whence proceed rust, and the like.

But the contraction of the tangible parts, after some of the spirit is discharged, upon which dryness ensues, is made sensible by the increased hardness of the body, but much more by the subsequent cracking or splitting of the body, and the contracting, wrinkling, and overwrapping of the parts. Thus the parts of wood crack or split asunder, and are contracted ; skins wrinkle, and if the spirit be suddenly forced out by the heat of fire, they shrink so fast as to curl and roll themselves up, &c.

On the other hand, where the spirit is detained, and yet dilated and excited by heat or something analogous thereto (as happens in the more solid or tenacious bodies), then the body is either softened, as in the case of ignited iron, or flows, as in melted metals, or liquifies, as in dissolved rosin, wax, &c. ; therefore these contrary operations of heat, hardening some bodies and liquifying others, are easily reconciled ; because in the first case the spirit is driven out, but agitated and detained in the second ; the latter being the proper action of heat and spirit, and the former the action of the tangible parts, succeeding upon the emission of the spirit.

But where the spirit is neither quite detained nor quite discharged, but only attempts and tries to force its prison, and readily meets with such tangible parts as will obey and yield to its motions, so that wherever the spirit leads they follow it, then it is that an organical body is formed, with its distinct

parts or limbs, and that all the vital actions ensue, as well in animals as vegetables.

18. *Instances of the Road (Instantiæ Viæ)*; called also *Itinerating* or *Journeying*, and *Articulated*: or *Jointed Instances (Itinerantes et Articulatæ)*.

19. *Instances of Supplement*, or of *Substitution*; called also *Instances of Refuge (Instantiæ Refugii)*.

20. *Lancing Instances (Instantiæ Persecantes)*, or *Instances of Democritus*; called also, for a different reason, *Twitching Instances (Instantiæ Vellicantes)*. To which are to be subjoined those called the *Limits of the Lancing (Metæ Persecationis)*; the consideration of which, however, is deferred to the head of the Supports of Induction (intended to form the next part of the treatise).

Such are the instances which assist the senses: those that remain are principally of use for operation or practice ("ad partem operativam"). They are seven in number, and are called by the general name of *Practical Instances*. Now there are two defects in practice. It either deceives, or it imposes too much trouble ("onerat nimis"). It deceives from the forces and activities of bodies being ill determined and measured. Now these forces and activities are circumscribed and measured in four ways; namely, by place, or by time, or by union of quantity ("per unionem quanti"), or by predominance of virtue. The four corresponding classes of instances are called *Mathematical Instances*, or *Instances of Measure*. Practice again is troublesome, either on account of the intermixture of useless things, or on account of the multiplication of instruments, or on account of the bulk of the material and of the substances which may be required for any work. The instances, therefore, that are to be prized here are such as either direct operation to those things which are of most consequence to mankind, or lessen the number of instruments, or the quantity of material. Hence three classes of instances, which are called by the general name of *Propitious* or *Benevolent Instances*.

21. *Instances of the Rod or Radius (Virgae sive Radii)*; called also *Instances of Endurance (Perlativis*)*, or of *No Farther (Non Ultra)*.

22. *Instances of the Course (Curriculi)*; called also *Water Instances (Instantiae ad Aquam)*, from the water-clocks of the ancients. These are instances of the measuring of things by time. Under this head Playfair observes that Bacon, after remarking that every change and every motion requires time, has the following very curious anticipation of facts, which appeared then doubtful, but which subsequent discovery has ascertained:—“The consideration of these things produced in me a doubt altogether astonishing, namely, whether the face of the serene and starry heavens be seen at the instant it really exists, or not till some time later; and whether there be not, with respect to the heavenly bodies, a true time and an apparent time, no less than a true place and an apparent place, as astronomers say, on account of parallax. For it seems [Bacon’s word is *videbatur*—*it seemed*] incredible that the species or rays of the celestial bodies can pass through the immense interval between them and us in an instant, or that they do not even require some considerable portion of time.”—“The measurement of the velocity of light,” Playfair subjoins, “and the wonderful consequences arising from it, are the best commentaries on this passage, and the highest eulogy on its author.” Bacon, however, immediately proceeds thus:—

But this suspicion, as to any great interval betwixt the real and apparent time afterwards vanished, upon considering that infinite loss and diminution of quantity, as to sight, between the real body of a star and the apparent object, which difference is caused by the distance; and, at the same time, considering to what a distance objects that are barely white may, of a sudden, be seen here below, amounting to sixty miles at the least; for there is no question but that the light of the celestial bodies

* Shaw translates *Permeating Instances*; Mr. Wood, *Instances of Completion*.

has not only the vivid strength of whiteness, but also vastly exceeds the light of flame, as we find flame here in power and strength of radiance. Nay, that immense velocity wherewith gross matter moves, in the diurnal rotation, renders this wonderfully swift motion of the rays of light, from the fixed stars, more probable. But what has the greatest weight with me is this, that if there should here be any considerable space of time between reality and sight, or the existence of the object, and its being seen, it must then happen that the sight would be frequently intercepted and confounded by clouds arising in the mean time, or by the like disturbances in the medium. And thus much for the simple mensuration of time.

23. *Instances of the How Much (Instantiæ Quanti)*; called also *Doses of Nature (Doses Naturæ)*.

24. *Instances of Struggle (Instantiæ Luctus)*; called also *Instances of Predominance*. Here Bacon enumerates and illustrates at great length the principal kinds of motions and active virtues or powers in nature; which he makes to be, 1. Motion of Resistance (*antitypias*); 2. Of Connexion (*nexus*); 3. Of Liberty; 4. Of Matter (*hyles*); 5. Of Continuity (*continuationis*); 6. Of Acquisition (*ad lucrum*), or Of Need (*indigentia*); 7. Of Greater Congregation; 8. Of Lesser Congregation; 9. The Magnetic Motion; 10. Of Avoidance (*fugæ*); 11. Of Assimilation, or Self-multiplication, or Simple Generation; 12. Of Excitement; 13. Of Impression; 14. Of Configuration or Position (*situs*); 15. Of Penetration (*Per-transitionis*), or Motion according to the Passages (*secundum meatus*); 16. The Royal or Political Motion (by which the predominant and ruling parts in any body bridle, conquer, subjugate, and regulate the rest, and compel them to unite, to separate, to stand still, to move, to take their places, not according to their own inclinations, but with a reference to, and as may be most conducive to the welfare of, that ruling part); 17. The Spontaneous Motion of Rotation (with its nine different species, all likewise enumerated); 18. Of Trepidation; 19. Of Repose (*decubitus*), or of Aversion to Motion (*exhorrentiæ motus*).

25. *Prompting Instances (Instantiæ Innuentes)*.

26. *Many-sided Instances* (*Instantiæ Polychrestæ*, literally *Instances of many uses*.) The ways in which man acts upon natural bodies (besides their mere application to and removal from one another), are stated to be seven: 1. By the exclusion of whatever impedes or disturbs; 2. By compressions, extensions, agitations, and such like; 3. By heat and cold; 4. By detention in a suitable place; 5. By checking and regulating motion; 6. By means of special agreements, or sympathies, in things (*consensus*); 7. By a temperate and due alternation, and a series and succession of all these ways. These seven methods are all illustrated at great length.

27. *Magical Instances*; being those in which the matter or efficient cause is slight or small in comparison of the magnitude of the work or effect produced.

And so much for the subject of prerogative instances. It must be observed, that in this our new machine for the understanding, we deliver a logic, not a philosophy: but as our logic directs the understanding, and instructs it, not like the common logic, to catch and lay hold of abstracted notions, as it were by the slender twigs, or tendrils, of the mind; but really enters and cuts through nature, and discovers the virtues and actions of bodies, together with their laws, as determined in matter; so that this knowledge flows not only from the nature of the mind, but also from the nature of things, and the universe; hence it is no wonder that, in order to give examples and illustrations of our art, we every where employ physical considerations and experiments. . . .

And now we should proceed to the helps and rectifications of induction, then to concretes, latent processes, concealed structures, &c., as mentioned in order under the Twenty-first Aphorism; that at length, like faithful guardians, we might possess mankind of their fortunes, and release and free the understanding from its minority, upon which an amendment of the state and condition of mankind, and an enlargement of their power over nature, must necessarily ensue. For by the fall man at once forfeited his innocency and his dominion over the creatures, though both of them are, in some measure, recoverable, even in this life: the former by religion and faith, and the latter by arts and sciences. For the world was not

made absolutely rebellious by the curse, but, in virtue of that denunciation, "In the sweat of thy brow shalt thou eat thy bread," is at length, not by disputes or indolent magical ceremonies, but by various real labours, subdued and brought in some degree to afford the necessaries of life.

END OF VOL. II.

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ERRATA IN VOL. I.

Pages 119, 139, 153, read "Blackbourne."

Page 161, note; insert semicolon after "minuteness of detail," line 9 from bottom; and after "in half a page," line 8 from bottom.

Page 162, note; insert semicolon after "the *Second* volume," line 6 from bottom.

Page 168, line 12 from bottom, for 1628, read 1625.

Page 214, note; insert, — after "before that year," line 6 from bottom.

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